REPORT RESUMES

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REPORT OF A NATIONAL VOCATIONAL EDUCATION SEMINAR ON THE ADMINISTRATION OF RESEARCH (COLUMBUS, MAY 24-27, 1965).

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THIS WAS ONE OF FOUR SEMINARS CONDUCTED TO IMPROVE THE QUALITY AND QUANTITY OF RESEARCH AND DEVELOPMENT IN VOCATIONAL EDUCATION. OBJECTIVES WERE TO DEVELOP (1) A CONCEPT OF THE ROLE AND THE ESSENTIAL CONDITIONS FOR RESEARCH AND DEVELOPMENT IN STATE PROGRAMS, (2) AN UNDERSTANDING OF A FUNCTIONAL ORGANIZATIONAL STRUCTURE FOR CONDUCTING A PROGRAM OF RESEARCH AND DEVELOPMENT, (3) COMPETENCIES FOR ADMINISTERING SUCH A PROGRAM, (4) AN UNDERSTANDING OF THE DYNAMICS OF PLANNED CHANGE, (5) EMPATHY AND SUPPORT FOR RESEARCH AND DEVELOPMENT IN VOCATIONAL EDUCATION, AND (6) TECHNIQUES FOR CLARIFYING INDIVIDUAL AND ORGANIZATIONAL ROLES AND RELATIONSHIPS. TEXTS OF PRESENTATIONS BY THE CONSULTANT STAFF ARE GIVEN. THEY WERE (1) "THE ROLE OF RESEARCH AND DEVELOPMENT IN VOCATIONAL EDUCATION," (2) "A PHILOSOPHY OF RELATIONSHIPS IN STATE RESEARCH AND DEVELOPMENT," (3) "A RATIONALE FOR THE ESTABLISHMENT OF A VOCATIONAL EDUCATION RESEARCH STRUCTURE," (4) "OCCUPATIONAL EDUCATION IN RESEARCH--THE NEW YORK STATE EDUCATION DEPARTMENT'S STRUCTURE," (5) "ADMINISTRATIVE CONCERNS IN ASSESSING DEVELOPMENT AND DEMONSTRATION PROJECTS," (6) "PROCEDURES AND TECHNIQUES FOR THE ADMINISTRATION OF RESEARCH," (7) "THE ANATOMY OF A FUNDED PROPOSAL," AND (8) "DIFFUSING EDUCATIONAL INNOVATIONS." (EM)

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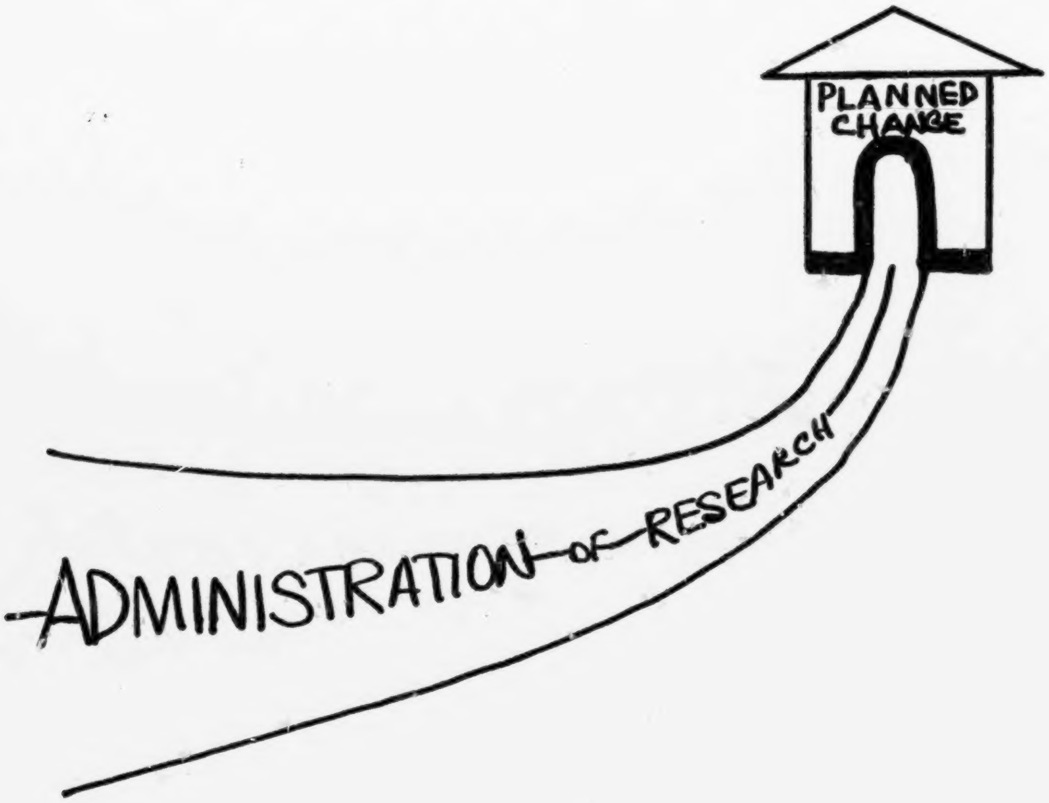
NATIONAL VOCATIONAL-TECHNICAL EDUCATION SEMINAR
ON THE
ADMINISTRATION OF RESEARCH



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Columbus, Ohio

May 24 to 27, 1965

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REPORT
OF
A NATIONAL VOCATIONAL EDUCATION SEMINAR
ON THE
ADMINISTRATION OF RESEARCH

The Center for Research and Leadership Development
in Vocational and Technical Education
May 24 to 27, 1965

The Ohio State University
Columbus, Ohio

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PREFACE

Expanded programs of vocational and technical education, increased funds for research and development, rapid changes in technology, educational innovations, and new orientations and relationships are but a few of the many factors which emphasize the need for increased quality and quantity in our research and development efforts. One of the critical considerations in our expanded efforts is the administration of research. It was the broad purpose of this seminar to focus on those administration aspects which facilitate improved and expanded programs of research and development. Admittedly, a seminar of such brief duration can only scratch the surface. We also recognize that many worthwhile ideas and suggestions developed during the seminar deliberations "fell between the chairs" and were not captured in this report. However, we believe the papers presented by the consultants will be of value to the participants and other research workers and administrators who were not able to attend.

This Vocational Education Research Seminar was one of four conducted in cooperation with the American Vocational Association Research Committee, the Occupational Research and Planning of the U. S. Office of Education, and the host institutions. Other research seminars were conducted at the University of Minnesota, the University of Nebraska, and Michigan State University.

As seminar director, I would like to acknowledge the assistance and cooperation of personnel in Occupational Research and Planning in the Vocational and Technical Education Division of the U. S. Office of Education; members of the Program Planning Committee at The Ohio State University; Dr. Rupert Evans, Chairman of the American Vocational Association Research Committee; and Dr. William John Schill, Coordinator of the Vocational Education Research Seminars this year, both of The University of Illinois. Special thanks is due the capable consulting staff for their varied and valuable contributions to the seminar. One of the strengths of the seminar was the varied background and perspective of the participants. Their enthusiasm, interest, and participation contributed materially to the seminar outcomes.

Robert E. Taylor
Director

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PURPOSE OF SEMINAR

To improve the quality and quantity of research and development in vocational education

OBJECTIVES

1. To develop a concept of the role of research and development in state programs of vocational education and the conditions essential to its success
2. To develop an understanding of a functional organizational structure for conducting a program of research and development in vocational education
3. To clarify key individual and organizational roles and relationships
4. To develop competencies in administering a program of research and development
5. To develop an understanding of the dynamics of planned change and its application to vocational education
6. To develop empathy and support for research and development in vocational education

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PRESENTATIONS
BY THE
CONSULTANT STAFF

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THE ROLE OF RESEARCH AND DEVELOPMENT IN VOCATIONAL EDUCATION

by
Henry M. Brickell
Assistant Superintendent
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Manhasset, New York

There are a number of steps in the process of inventing and diffusing innovations in any field of human endeavor--medicine, agriculture, industry, education -any field. What goes on at one stage of the research and development process is quite different from what goes on at another. In fact, the circumstances which are correct for any one of them are essentially wrong for all the others. The purposes are different; the people are different; the costs, the signs of excellence and the measures of success for the several stages all are different. Inasmuch as those differences cannot be reconciled, the stages cannot be telescoped or combined. Moreover, since each one must grow out of the preceding (in a carefully-planned program) they must occur in a certain sequence over a period of time. Their order cannot be changed. Furthermore, most people prefer to work in one stage and find working in the others uncomfortable if not distasteful.

Those are my propositions to you.

It ought not be necessary to cover this ground with you who are experts in vocational education because you are all students of agriculture and industry. Those two fields (along with medicine, business, and the military) offer the most compelling proof of what a serious program of research and development can accomplish. I can do little more than call sharply to your attention what you already know but perhaps have not yet applied to your work as educators.

Frankly, if you were not educators it would hardly be necessary. But since you are, I will pretend that you are as innocent of research and development as the remainder of the profession and will even presume to tell you something about agriculture.

Most of us who have written about research and development in education have recognized several stages along a line of activity. All of us tend to put something called basic research over toward the early end, something called development along in the middle, and something called demonstration over toward the late end. Beyond that modest amount of agreement, however, we cannot seem to go. We all cut the line at different places and use all sorts of names to label the segments.

It is well worth noting that the man who likes to work at a particular stage carefully slices it up into several substages and names each one. I am reminded of the map showing the USA as seen by Ohioans--Steubenville on the Atlantic, Dayton on

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EDITOR'S NOTE. Dr. Brickell preceded his paper with comments based on his experiences reported in the publication, Organizing New York State for Educational Change. See pages 23-29 of an article from Theory Into Practice, Vol. I, No. 2, April, 1962, which capsules these experiences and observations.

the Pacific, and Cincinnati on the Gulf. This pheonomenon is worth your attention because the people whose work you administer are likely to be myopic Ohioans about their own work. They may show little, if any, interest in the work of men at other stages. Unless you yourself can keep the entire research and development spectrum in view, the more able and energetic of the men who work for you will inevitably lead you to over invest in their favorite stage.

Last week in Washington as a panelist for one of the research and development programs I read a proposal from an extraordinarily able group of researchers who enjoy working together. They proposed to spend many weeks and much money getting together to plan what to do, a little time working with school people persuading them to do it, and many months and much more money evaluating the effect of their work on the schools. Like almost every multi-stage proposal I have ever read, it ballooned out at the proposers' points of special interest, then deflated at the others. That particular proposal was dumbbell-shaped.

Because the names of the several stages are not worth arguing about and because the smaller divisions are difficult to distinguish, I will simply number the major steps in order Some of the names commonly used to label various stages are shown below the line in a rough sequence from left to right. (See attached chart titled: A Research and Development Sequence on page 22).

STAGE I - INQUIRING INTO THE WAY THINGS ARE. The ideal circumstances for Stage I are: detachment from any specific or immediate problem, the absence of a timetable, and no expectations except that knowledge will be produced. (More about the circumstances later.)

The whole process of inventing and diffusing innovations in any field should begin with an understanding of what the world is made of and how it is put together.

In the human enterprise we know as vocational educators, we want to start by understanding the circumstances, processes, and effects of learning to work. We want to know why man works--the economic, political, social, and ego-related significance of it to him. We want to know the psychological effect of unemployment. We want to know how girls choose careers. We want to know how factory work was represented in 19th Century English novels. We want to know the relation between intelligence and manual dexterity. We want to know what leads to success or failure on the job. We want to know which old jobs will disappear, which new ones will emerge. We want to know the salaries paid to refrigeration maintenance men during their first three years of employment. We want to know how many boys cut electronics class at Southwest Tech the day after Thanksgiving last year. Throughout all this, we would especially like to know the relationships of cause and effect so that we can deliberately control events in the future.

You can see that some of this information is more "basic" than the rest. That is, it explains more. You can also see that the information gathered will be "useless" in and of itself. It will remain "useless" until someone takes it and says, in effect, "Well, if that's the way things work, how could I make a particular thing happen? Now if I were to take . . ." With that thought, he has moved across the line from Stage I into Stage II.

STAGE II - CREATING A PROCEDURE FOR GETTING SOMETHING DONE. The ideal circumstance for Stage II are ones of artificial enrichment and extraordinary freedom. (More about that later.)

In Stage II a goal is set and a procedure is devised to achieve it. The planner does not have to know anything whatever about Stage I. That is, we can have invention without research, engineering without physics. But you can see that a man can design better if he knows the properties of his materials in advance.

In vocational education, Stage II is the translation of what is known about learning vocations into programs for teaching vocations. It is the creation of teaching equipment, teaching materials, teaching schedules, and teaching procedures. If the resulting program is to be exported outside the original invention setting, it must first be fully formulated, clearly described, and accompanied by all the equipment and materials (books, films, teachers' manuals, pupil examinations) needed for its use. If this is not done, an exportable instructional program has not yet been invented and it cannot possibly be moved into Stage III.

STAGE - III DETERMINING WHAT A PROCEDURE WILL DO. The ideal conditions for Stage III are those which are controlled whenever possible and closely observed when control is not possible. (More about that later.)

In Stage III we find out what the newly-devised procedure is good for --if anything-- and what is costs to use. We compare its effectiveness and efficiency to that of other procedures which already exist and have the same goals.

Here we are not interested in whether it will grow in the greenhouse or tick in the laboratory. Since we are checking it out for possible widespread use, we test it under all kinds of circumstances, exposing it to the risks of all weather conditions, indifferent care, and ordinary people.

In vocational education, Stage III means actual use of the program in the whole range of school classrooms with all kinds of teachers and all sorts of students. At the end, we want to be able to say to the prospective user: "If you have these kinds of socio-economic conditions in your community, and this kind of teacher in your school, and if your students are thus and your goals are these, and if you can acquire the following equipment and materials and use them as indicated, then this particular procedure will do such and such a thing for you."

When we can say that about a program, it is ready for Stage IV.

STAGE IV - MOVING A PROCEDURE INTO GENERAL USE. The ideal conditions for Stage IV provide for the dissemination of information; the demonstration of the proven procedure in natural, garden-variety settings; the persuading of administrators; and the training of teachers. (More about that later.)

In Stage IV the new procedure is moved out of the evaluation phase and installed in the field settings for which it has been proven useful.

It is important that what is spread be an authentic version of what was invented in Stage II and proven in Stage III. It is not unusual to find that field settings are not yet equipped to use an innovation. If they cannot be properly equipped, the innovation cannot be spread. Moreover, once a new program has been installed, it must be maintained or it will tend in time to lose its distinctiveness and fall in quality.

The purpose of Stage IV activity is not to gain new knowledge, not to develop new procedures, and not to evaluate them. The purpose is to spread what has been proven superior.

A Closer Look at the Several Stages.

The most striking feature of the research and development patterns in other fields is the existence of separate agencies for different functions. The distinctions between the several stages is perhaps clearest in agriculture, where it took fifty years of trial and error to discover the differences and get organized to deal with them. (Please forgive me while I run a bucket of coals up to Newcastle.)

In 1862, Federal legislation authorized the creation of colleges of agriculture as part of the land-grant institutions established under the Morrill Act. (You will recognize this as a Stage IV activity, intended to reach pre-service farmers.) In 1887, twenty-five years later, the Hatch Act created agricultural experiment stations to discover something definitive for the colleges of agriculture to teach. (This was primarily to take care of Stage III and Stage II, with minor attention to Stage I.)

I would estimate that vocational education today is about where agriculture was in 1887. We are educating workers today fairly well and we can go on doing it, getting gradually better by swapping the practices we evolve through trial and error. But suddenly we are offered over $20 million a year to get better faster.

For twenty-five years after the Hatch Act of 1887, in addition to underpinning the college curricula, the experiment stations tried to disseminate research findings directly to farmers. Issuing research reports was soon abandoned because (and here the analogy with education becomes irresistible) research men wrote increasingly esoteric reports addressed primarily to each other. The stations then tried three day institutes, traveling exhibits, bulletins, speeches, demonstrations at the stations--the same kind of techniques we use today in education. They failed for them as they have for us and for many of the same reasons. As a consequence, the Smith-Lever Act in 1914 created the agricultural extension service to solve the special problem of disseminating innovations to farmers already in service. Both the Morrill Act and the Hatch Act neglected this problem. (So does the Vocational Education Act of 1963, as I read it. I wonder whether it will take us twenty-five years to find that out.)

The Smith-Lever Act completed the basic machinery of agricultural research and development--fifty years after it was begun. I note with great interest that it has not had to be significantly redesigned in the fifty years since. An impressive test of its adequacy. Permit me to oversimplify in describing how it works:

Drawing upon basic research in agriculture itself and in the scientific fields which underlie it, the staff of an agricultural experiment station is free, for example, to develop (to invent or create) a new strain of seed. The new seed is then tested on a wide variety of plots owned, leased or otherwise controlled by the experiment station. During this evaluation period, the circumstances surrounding the growth of the seed are controlled where possible and are observed and recorded where control is impossible, as with rainfall. At the conclusion of a successful field test, staff members of the experiment station describe the results in research reports. The dissemination process then begins. An extension specialist translates the research into a practical plan for using the new seed strain. The county agent is then responsible for promoting the use of the new seed. He frequently starts by persuading one farmer to demonstrate its use on his own farm so that neighboring farmers can be brought in to observe the results. For the farmers who want to change, the agent supplies the necessary knowledge and offers his continuing help.

Medicine and industrial development offer parallel examples.

Let us now examine each phase of research and development in education with greater care. The conditioners of success suggested here are offered as possible criteria for judging proposals. They are different at each stage, of course, and the differences should be carefully noted. Although the categories created here are an idealized conception, which will be followed only rarely in the proposals you will receive, they can serve to help you-- and the proposers -understand what they are driving at and whether they have the right horses for the task.

STAGE I

The best atmosphere for inquiring into the way things are is one in which highly capable men have been released to pursue their own interests and are expected only to produce knowledge. There is, ideally, no goal in sight other than the discovery of information. There are no deadlines. There will be time to pursue at greater length whatever is discovered. The results do not have to draw the applause of other workers, get into the newspapers, or succeed in the marketplace.

The men working at Stage I are not responsible for seeing that their work is translated into something useful at Stage II. In all likelihood, no Stage I study will lead directly to a Stage II product. In fact, Stage I studies will often lead to nothing whatever. What men discover at Stage I goes into the general fund of knowledge generated by mankind. There it may someday be drawn upon--if anyone cares to do so.

For its part, Stage II activity will always dip into the whole pool of knowledge produced by Stage I and will not attempt to sustain itself on a trickle on information from a single Stage I source. In other words, it is neither reasonable nor necessary to expect all research inquiry to have immediate value.

Indeed, it does not matter whether the possible implications of a Stage I study are too expensive, impractical, or otherwise unacceptable for operating vocational education programs as we know them today. In fact, while the inquiry is in progress, any concern for the applicability of the findings can distract the researcher, narrow his effort, and hasten him to unjustified conclusions.

Our failure to recognize the value of basic research and our reluctance in education to finance adequately the special circumstances needed for it -along with our natural but premature eagerness to have the researcher translate his results into educational programs--have prevented or damaged many basic research efforts. They have led some of our finest minds to try to convert their finding to practical use and to seek recognition through advertising them or to seek money for further research through selling their findings to schools. Such use of research talent, although understandable, is wasteful. Fundamental progress stops while these men go out into the marketplace. They should be supported to do what only they can do. We distract them to our loss.

Stage I research does not conclude with a set of instructions telling the reader what to do with the results It says simply, "The investigators note with interest that, within the limited scope of our inquiry, things seem to work about like this--with such and such a degree of probability that we are correct." It is up to the reader to make what he can out of the knowledge offered to him.

I might remind you that the state legislatures and the Congress have not typically expected the men who staff the bureaus of the executive branch to pursue knowledge in a lesisurely atmosphere of detachment without regard to its ultimate use. You may consider how much Stage I inquiry it is fair to expect from the men in state education departments.

Much of the research into human behavior which underlies--or should underlie--vocational education programs is carried out not by vocational education specialists themselves, but by economists, sociologists, anthropologists, and psychologists. It will undoubtedly lie there, unused, unless sifting through it becomes a standard part of all Stage II activity. It is my opinion that future efforts to develop vocational education programs should draw heavily upon Stage I research. I believe that the best designs will come from the conscious, deliberate, planned translation of that research into programs for teaching.

STAGE II

The basic ingredients of a good invention setting are a richness of talent and a freedom to explore. At its best, Stage II provides for (1) a group of highly intelligent people, (2) a somewhat limited problem, (3) time to concentrate on a solution, (4) ample money and resources, (5) freedom to try almost anything, (6) the likelihood that the solution will be used somewhere, and (7) the prospect of personal recognition if the problem is solved. The more artificial, enriched and free the setting, the more distinctive the innovation it is likely to produce.

Freedom is essential. The atmosphere and the actuality of freedom must be deliberately created.

The Atmosphere. I always did poorly as a boy on the match-stick puzzles in my comic books. I could never move three matches and wind up with five squares, or whatever. When I turned in frustration to the solution, it usually said something like: "Stand matches #4 and #6 on end and lay #2 horizontally across the top. (We didn't say you had to lay them flat!)" I was always a victim of self-imposed restrictions. Most of us bring to any problem a set of limitations which are in us rather than in the problem. The technique of group "brainstorming" is governed by a set of rules meant to wipe out artificial limits--you are to say whatever springs into your mind, you are encouraged to stretch another man's unorthodox suggestion into something really outlandish (the old-fashioned word for "way out") you are rot to criticize anyone's idea no matter how wild, and so on.

The Actuality. Beyond the matter of climate, you want the kind of exhilaration that comes when top management says, "Men, we want a solution and we don't care what it costs." The lifting of a monetary ceiling is a shorthand way of promising equipment, consultant advice, secretarial help, travel money, tryout schools--whatever, and this is important, whatever the inventors themselves think they need.

I have traveled occasionally among education's Stage II hothouses--those especially created curriculum development settings blessed with a favorable climate and enriched soil. I usually check out the seven ingredients I have suggested to you here. Once I met two biology teachers who had been hired by an industrial giant for the summer and freed to pursue their own research on the DNA molecule in the hope that they might come up with some techniques useful for teaching high school biology. They came out of their modern laboratory, past their technician's office, and into the paneled anteroom. We stood on the carpet, chatting about their travels in conjunction with the project; then I ticked off the seven criteria and asked, "Right or wrong?"

"Wrong on one," said the older. "You don't need lavish resources."

"You don't?" I said, looking around.

"No," he said. "The resources don't have to be lavish. All that's necessary is that they give you everything you ask for."

His remark is a classic. It goes to the heart of the matter. For what would in any other circumstance be extravagant is in an invention setting a matter of simple necessity.

The typical operating school does not provide a setting rich enough or free enough to generate new instructional programs. Faculties usually carry heavy responsibility for operating standard programs. Often overburdened with routine duties, they can rarely take their hands off the wheel of labor long enough to invent something better.

The national curriculum studies sponsored by the National Science Foundation's Course Content Improvement Section--PSSC physics, SMSG mathematics, BSCS biology, CHEM and CBA chemistry--all sprang, without exception, from artificially created, enriched, free settings. They did not arise naturally from the workaday world. None of them would exist today if a large group of talented men had not been paid and freed to concentrate specifically on designing them. NSF spent about $1½ million to develop CBA chemistry, $6 million to develop PSSC physics, and $8 million to develop SMSG mathematics. Those, by the way, are all Stage II costs; they do not include Stage IV costs, which in the case of PSSC have run an additional $8 million so far. Six million to develop PSSC, $8 million to spread it. No wonder it is the success story of our time.

Not all limitations are monetary. State education departments are notoriously prudential in outlook, and they have their regulations to prove it. The Federal funds which came to vocational education first with Smith-Hughes and subsequently with other laws have--until the Vocational Education Act of 1963--been accompanied with highly prescriptive provisions. Regulation in any form, no matter how broad and no matter how well intended, always inhibits innovation. Suppose you require only the most general conditions--say that students be taught in a school building by college educated personnel at a per pupil cost of $400 per year or above. No government agency stops at that. But even if it did, the room for inventing new forms of vocational education would have been severely restricted.

The five states involved in the Ford-financed Western States Small Schools Project faced this problem head on $3\frac{1}{2}$ years ago. They established five criteria for membership. The fifth, titled "Freedom to Experiment," requires that "all governing boards (i.e., state boards of education, boards of trustees, etc.) of the state departments of education or institutions of higher learning must adopt a resolution that the project will not be obstructed by any regulations which might restrict or deter or in any way deny the free and unrestrained examination of methods and techniques specifically designed to assist in the development of higher quality of educational opportunity."[1] I commend their fine example to you. Existing regulations ought to be suspended in Stage II while better methods are being sought.

In summary, the Smith-Hughes and George-Barden Acts did not give us the continuous cycle of innovation we must have in vocational education--largely because, in my opinion, they did not call for the deliberate creation of Stage II seedbeds. The Act which brings us together today corrects that condition. What it takes for Stage II is bright people, a limited problem, time to work on it, lavish resources, maximum freedom, the probable use of the invention, and the promise of recognition for the inventors. To the best of my knowledge, if you omit any one of them, the resulting invention will be fragmentary or deformed.

STAGE III

At its best Stage III activity provides conditions in which the forces which might influence the success of the new approach being tested can be controlled when possible and kept under close surveillance when actual control is impossible. The detachment from practical affairs, which is an important feature of Stage I and the great freedom which must characterize Stage II, would be inappropriate and ultimately destructive in Stage III.

Stage III calls for the systematic testing of a new instructional approach to find what it will accomplish under what conditions The empirical evaluation of programs by using them in many different schools under carefully controlled or closely observed conditions can be described as field testing. In the test, the novel procedure must be used over a period of time and its results compared with the results of other procedures used under similar conditions. The process requires two restrictions: (1) procedures must not be changed in mid-stream; otherwise it will not be clear what is being evaluated, and (2) the circumstances in which the procedures are used must be kept comparable; otherwise it will not be clear what environmental conditions are determining the outcome.

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[1] Colorado State Department of Education, An Introduction to the Western States Small Schools Project, Colorado State Department of Education, Denver, p. 18.

A broad field test is desirable because we know so little about the conditions which affect learning in school. New programs should be tested in situations so diverse that all the forces which play upon learning, even though unknown, will nonetheless be present to influence the results. A program may prove satisfactory in most schools while giving spectacular results in one particular setting and abysmal results in another. Only by extensive field testing can we avoid the error of labeling a program a success or a failure because it happened to be tried in a single circumstance where an unknown factor dictated the results.

We are relatively unfamiliar with Stage III endeavors at the present time in education. Ordinarily the step is skipped entirely and we move directly from II to IV, disseminating raw, untested inventions. Many of our most talked-about and earnestly promoted innovations have yet to be carefully assessed--instructional television, flexible scheduling, team teaching, non-graded plans, programed instruction, and even the widely respected NSF science and math courses mentioned earlier. The same situation appears to exist in vocational education.

The field testing called for in Stage III is to be distinguished from the common use of field trials in Stage II. Field trials are often used to collect suggestions from teachers as to how the course could be improved and to determine whether the course is workable at all in a natural setting. All the NSF courses have had the benefit of field trials and were greatly modified by them. But tryout for the purpose of redesign is not the same as testing to find whether a completed program is effective and to ascertain where it should be used. It is this final step that we usually skip.

Note also that field use is not the equivalent of field testing. Years of field use may prove only that a practice in vocational education is feasible--not necessarily that it is effective. It is revealing to observe that the degree to which a program has been carefully evaluated has nothing to do with its age. I daresay we have as little actual hard evidence about the effectiveness of work experience in distributive education as we have about the effectiveness of our new courses in computer technology.

The evidence we seek from a thoroughly-planned, well-designed Stage III activity will not come to us in any other way. It is not a natural occurence. It must be consciously planned for and men must be trained to do it. As many as twenty or thirty different schools should be used in a single test. The process may occasionally be concluded within one or two years, but will usually take longer because longitudinal studies will often be required.

In the same way that Stage II development can proceed without the benefit of Stage I research, Stage III evaluation can be applied to any program no matter how it was developed. It is not necessary to wait until an innovation has been bred in the incubator recommended for Stage II. New approaches have been and will continue to be designed in all sorts of settings, including an occasional local school system. They should be as eligible for field testing as any developed under more scientific conditions.

STAGE IV

Like all earlier phases, Stage IV has its own subordinate stages. The chief ones are: (1) acquainting schools with the existence of the new program, (2) persuading school administrators to adopt it, (3) making certain the school acquires the necessary machinery and materials, and (4) teaching staff members how to conduct the program.

Clearly, Stage IV is not "research" and it is not "development" in the sense of creating something new. Yet any so-called research and development program which stops short of Stage IV may never touch a pupil in a classroom. The heavy work of research and development lies in moving proven new programs out into the field settings where they ought to be used.

Innovations are not eagerly sought by all schools. They do not flow automatically across the nation simply because they have merit. They can be urged from national platforms, attractively packaged, tested and found to be good, stamped "Safe for human consumption"--and still they may sit in the warehouse.

I offer you my observations about Stage IV--my favorite term for it is dissemination--as it appears to work in elementary and secondary education generally and leave it to you to test them against your own experience in vocational education.

As Everett Rogers will undoubtedly tell you when he speaks later in the conference, it is one thing to be informed and another to be convinced. Knowing that something exists is only a first--and not very big--step in the successful adoption of an innovation. (This is one of the things it took agriculture twenty-five years to discover and the Smith-Lever Act to cure.) Furthermore, since we are discussing institutional adoptions rather than farming practices, keep in mind that the man to convince is the administrator located at the control center of the institution we want to change.

The most effective way to convince a school staff that it should adopt a new program is to let it observe the successful new approach in action. Nothing persuades like a visit. Written descriptions of the new program, speeches about it and research reports concerning it should all be regarded as preliminary or supplementary to a visit

The innovation must be demonstrated under conditions which are not abnormal, artificial, or unrealistic--that is, not too different from the everyday circumstances in the observer's own school and community.

The most persuasive demonstration consists of the continuing use of the new approach as a basic part of regular instruction in a normal school setting. Anything which smacks of a "performance" by extraordinary teachers working under artificial conditions for a limited time is likely to be unconvincing. The observer may express interest, but he cannot be certain the approach would work day and day out in the hands of the average teacher in his own school.

After the visit, if the local school decides to take on the new program, it is essential that its staff be thoroughly educated in the professional skills necessary to carry it out. The development of those qualities in the staff requires far more elaborate steps than most schools even think of providing ordinarily. In the ideal situation for re-education, the teacher of teachers knows more about the innovation than those he is re-educating and has himself succeeded in using the program with children. The instruction reaches simultaneously all teachers who should use the innovation, extends over a long period of time, and is interspersed with actual classroom practice in using the innovation.

Furthermore, turnover in local faculties is so high that re-education for an innovation must be available continuously to new teachers entering the school. Adequate arrangements for doing this locally are almost non-existent, as you know. Here is where state leadership directly or through intermediate units is essential.

In summary, successful dissemination depends upon realistic demonstrations followed by intensive, continuing re-education.

Let me conclude my observations about Stage IV with a comment about local adaptation. Adaptation is widely recommended as superior to adoption. No doubt it is superior to the blind, slavish adoption of an ill-fitting innovation. But it has been my own observation that most local adaptations of programs developed outside are not a shrewd ingenious tailoring of the innovation to make it fit local needs. The final adaptation usually looks to me more like what they have left after they knocked the corners off getting it through the door. It appears to be the part they were actually able to get inside the school, given their shortcomings of space, time, equipment, materials, and trained personnel. I trust the point is apparent.

A Few Final Generalizations About the Research and Development Sequence.

These final generalizations are based on my own observations and constitute my own views. I cannot guarantee their accuracy; I can only say that they fit my experience.

As one moves from Stage I through Stage IV, from basic research to the dissemination of innovations, the following seems to be true:

* One man working alone can accomplish less and less.

* More and more people must be dealt with.

* Costs rise sharply.

* The value of a dollar diminishes.

* The amount of hardware and materials needed goes up.

* The average level of human talent goes down.

* Sharpness of thinking diminishes.

* Quality of ideas tends to be diluted.

* Ideas must begin to be pushed rather than left to be pulled from one stage to the next.

* Facts unaided by emotion become less persuasive.

- Emotion unenlightened by facts becomes more persuasive.

- Strategies of educational change must deal less with individual men and more with their institutions.

Probably the most significant final generalization I can offer - and in some ways the most disturbing - is this:

A mature program of research and development is one in which men are busily disseminating in Stage IV a set of innovations which are decidedly worse than those being tested in Stage III, which are themselves definitely inferior to those being invented in Stage II, which are themselves worse than they could have been if men had only known what they are now learning in Stage I. Or to accentuate the positive, what is now being learned in Stage I will soon make what is new being invented in Stage II look primitive, even though present Stage II developments frankly look far superior to those being tested in Stage III, which are clearly better than what is now being spread in Stage IV, which has, of course, already been proven superior to what schools were doing before.

Responsibility for Managing Research and Development.

Certain agencies in education are better equipped to work at one stage than another in research and development. They are differently situated with respect to legal responsibility, organizational structure, tradition, values, viewpoint, funds, and personnel. My view is that they should apply their strengths and not attempt to be all things to all men.

You will certainly reject this view outright. At least my experience has been uniform on this point. In my own 1961 study of educational change in New York State, for example, I wrote about the shortcomings of the state department, the school study councils, the teachers colleges, the laboratory schools, the commercial publishers, and everybody else. Afterwards, each told me that I had been wrong about it but that there was a lot of truth in what I had said about the others. However, their opinions were identical on one point: Each organization felt that, properly financed, it could almost single-handedly encompass the whole research and development sequence. Most of them, of course, knew that Buffalo is on the Pacific.

Quite honestly, I expect that you will go into your discussion groups later today and spend most of the time explaining that your own agency is both responsible and equipped to do the whole job. Nevertheless, I will propose that, as shown on the chart titled, A Research and Development Sequence, Stage I is especially suitable for universities and research institutes; Stage II, for universities, research institutes, and state agencies; Stage III, for state agencies; Stage IV for intermediate units and local school systems.

The reasons for this recommendation cannot be recounted here today, but are carefully presented in the report of my 1961 New York study, along with detailed recommendations for administrative structure. I do not know enough about vocational education to know how precisely the structure will fit. To take but one example of an exception, it was quite evident that in New York State in 1961, local vocational agriculture programs were well served in Stage IV without the benefit of intermediate units--probably because of the high quality of state personnel, their large number relative to the number of local programs, and their tradition of aggressive field leadership.

You will discuss proper administrative structure throughout in this conference. My only concern about structure is that if you ask an agency to stretch itself over a function not normal to it, it will be long on lip service and short on performance--and it will not even know that it is cheating.

One final point needs to be made: I speak here only of the management of the function, not of the participants. Local schools, for example, will be participants in every stage, I through IV.

The Need for a Planned Sequence of Research and Development

A school, like anv other institution, tends to continue doing what it was established to do, holding itself relatively stable and resisting attempts at restructuring. There is a sound reason for this: Stability in the institutional structure makes for maximum output of the results that structure was designed to produce. Any change in the arrangement of its elements tends to cut down production, at least until new habit patterns are formed.

There are two distinct groups of people who might be expected to call for change in an institution such as a school--those inside it and those outside of it. There is no question that, for reasons detailed at great length in the literature, the most powerful demands for change are generated outside an institution rather than inside it.

The case is no different with schools. They will be under external pressure to keep on modifying their vocational education programs as far into the future as any man can see. The primary reason for a systematic program of research and development is to see that the changes which are coming as a result of external pressures--and they are coming, one way or another--to see that the changes are made on a rational basis, are good for students, and ultimately good for our society.

A RESEARCH AND DEVELOPMENT SEQUENCE

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I	II	III	IV
INQUIRING INTO THE WAY THINGS ARE	CREATING A PROCEDURE FOR GETTING SOMETHING DONE	DETERMINING WHAT A PROCEDURE WILL DO	MOVING A PROCEDURE INTO GENERAL USE
Basic research Theory building Basic scientific investigation - content indifferent Basic scientific investigation - content relevant Empirical studies Experimentation Surveys Status studies Research	Development Applied research Innovation Design Invention Engineering Exploration Formulation Curriculum development Application Building pilot models Making prototypes Classroom experimentation Classroom trials Field trials	Field testing Laboratory testing Evaluation Assessment	Dissemination Diffusion Demonstration Teacher training Installation Adoption Adaptation Implementation Production Manufacture Distribution
Suggested Managing Agency:			
UNIVERSITIES & RESEARCH INSTITUTES	UNIVERSITIES, RESEARCH INSTITUTES, & STATE AGENCIES	STATE AGENCIES	INTERMEDIATE UNITS & LOCAL SCHOOL SYSTEMS

Henry M. Brickell
Manhasset, New York
May, 1965

(Dr. Brickell's Comments Based On His Experiences Reported In The Publication, Organizing New York State for Educational Change)

THE DYNAMICS OF EDUCATIONAL CHANGE[1]

What causes schools to change the way they allocate teachers, time, space, or other resources? How is shifting to ungraded classes, programed instruction, television, team teaching, large- and small-group instruction, and the like, achieved within the institutional framework? Given an existing set of dynamics and statics, how can more innovations be stimulated, evaluated, and the best ones extended to other schools and school systems?

To study the problem firsthand in New York State, the writer visited thirty-five local school systems of every complexion (one hundred schools, fifteen hundred classrooms), thirteen colleges and universities, the State Education Department, ten regional college-affiliated school-study councils, schools of medicine and agriculture, and a variety of professional, commercial, and school-related citizens' organizations. The discussion that follows is based upon the findings for one state, New York, but it has implications for school systems throughout the country.

The Process of Change within Local Schools

A school is a social institution in which someone teaches something to someone else with a method at a time in a place. The six major structural elements of the institution are teachers, subjects, students, methods, times, places. This study focused exclusively on programs which require significant shifts in the normal arrangement of those institutional elements. The writer did not investigate classroom practice—the behavior that the teacher is usually free to exhibit in his own classroom with his own pupils. It was found that the public and the school board, the administrator, and the teacher exert varying degrees of influence in instituting broad educational changes.

The Public and the Board. Parents, citizens' groups, and boards of education are not strong agents in determining the path of instructional innovation, but their influence is decisive when exerted. The public and the board are important sources of demands for new or better results, but not for specific instructional innovations, perhaps because they know little about teaching methods. However, if they do develop a lively interest in a new type of program—foreign languages in the elementary school, for example—that innovation is likely to appear.

The public and the board ordinarily do not inhibit the profession in introducing structural innovation. Factors such as mutual selection of each other by administrators and communities evidently cause public wishes to be absorbed into the schools so effectively that severe dislocations between the hopes of the profession and the ambitions of the community are rare. Thus the public is not identifiable as a separate force.

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[1] Theory Into Practice, Vol. I, No. 2, April, 1962.

The Administrator. Instructional innovations of the type studied are introduced by administrators—not by teachers. Even in the best of circumstances for the expression of new ideas—in schools where administrative authority is exercised with a light hand and faculty prerogative is strong—teachers seldom suggest distinctly new types of working patterns for themselves.

The complexity of group decision-making and the difficulty of a peer group's choosing among several attractive possibilities (or, more exactly, possibilities with different degrees of attractiveness for each member) are well known. The value of leadership and the uses of authority in such a situation are also well known. An administrator is powerful because he can marshal the necessary authority, if not the necessary leadership, to precipitate a decision. He may not be, and frequently is not, the original source of interest in a new type of program; but unless he gives it his attention and actively promotes its use, it will not come into being.

The great significance of administrative initiative is heavily disguished. Phrases like "democratic administration," "the team approach," "shared decision-making," and "staff involvement" are commonplace. Behavior to match them is rare. The participation patterns in widespread use are very often little more than enabling arrangements, organized after an administrator has decided the general direction (and in some cases the actual details) of an instructional change. The control center of the school, as things are managed today, is the administrator.

The Teacher. In the absence of administrative initiative, classroom teachers apparently can make only three types of instructional change:

1. Change in classroom practice—that is, any alteration in instructional procedure which a teacher can accomplish in his own classroom without disturbing the work of other teachers.

2. Relocation of existing curriculum content—an activity which a group of teachers commonly initiates and can carry forward relatively unassisted so long as there is no administrative opposition. A typical example would be the relocating of arithmetic topics between the fourth and fifth grades to assure proper dovetailing.

3. Introduction of single special courses at the high-school level—these are commonly terminal courses in a sequence. They are often begun at the initiative of a teacher who has just returned from an intensive learning experience, such as a summer institute.

Introducing the Change and Evaluating It

Professional suspicion about the value of innovations in other school systems, and even about the sincerity of other innovators, is a widespread and serious inhibitor of educational change. Administrators and teachers suspect that many new programs may have been concocted largely to gain recognition for their sponsors.

The most persuasive experience a school person can have is to visit a successful new program and to observe it in action. Speeches, literature, research reports, and conversations with participants outside the actual instructional setting are interesting, but relatively unconvincing. However, anything "abnormal," "unreal," or "artificial" in the circumstances surrounding an observed program—that is, anything appreciably different from conditions in the visitor's own school system—can rob a visit of persuasive effect. For this reason, people from a rural school district, for example, have little interest in visiting a wealthy suburb.

Despite initial apathy or even opposition on the part of a number of teachers, new instructional programs can be successfully introduced. Faculty members ordinarily begin to prefer new methods within four months to a year after a novel program has been introduced, regardless of their very early reactions. It seems reasonable to believe that after teachers learn how to do the new job, they feel competent and secure.

Proposed innovations often arouse feelings of inadequacy and uncertainty in teachers. These feelings should not be mistaken for outright resistance to the change; this is seldom the case.

The key to successful innovation is providing assistance to the teachers as they begin to implement the new approach. More new programs have been destroyed by inability than by reluctance.

In evaluating instructional innovations, pupil reaction is usually considered sufficient as a criterion. In the eyes of the practitioner, no other evidence outweighs student reaction as a measure of success. More complex evaluative techniques are rarely used. Even if the normal operation of the school produces pertinent information, such as scores on standardized achievement tests, the data are inspected with interest but are almost never regarded as conclusive in and of themselves. For example, if achievement-test scores show little or no difference as a result of the new procedure (which is what they usually show) but students nevertheless respond to the instruction with interest or enthusiasm, the method is judged to be superior to what was done before.

Instructional changes are nearly always reported as resulting in improvement. Almost everything new seems to work better. The writer's observations led him to conclude that the attention, encouragement, and recognition given to teachers by persons outside the classroom during the introduction of new programs are among the strongest causes of their success.

Classroom teachers normally work in such isolation that the kind of attention provided by the principal and others during major instructional changes can scarcely fail to have an exhilarating effect. The "Hawthorne effect"—higher production stimulated by a change which does not alter the original resources—evidently goes hand in hand with educational innovation.

The Role of Outside Institutions and Organizations

A number of organizations outside the local school system attempt to influence innovations. They meet with mixed success.

The State Education Department. Because the state education agency in New York is larger and more influential than that in most other states, observations concerning it may have limited applicability. The following might fit a number of other state education departments:

The department both promotes and inhibits change. It encourages the adoption of innovations that it officially endorses, discourages the adoption of others. Departmental discouragement inhibits all but two types of schools—the slow-movers who never even reach the boundaries of state approval and the fast-movers who, in their own words, "Don't ask."

The department has no adequate mechanism for encouraging experimentation along lines that it does not officially approve. Despite many recent moves to sponsor innovation, it is still essentially prudential in outlook and devotes much of its effort to regulatory activities. It is entirely too small to provide direct service to the schools.

The Colleges and Universities. Except for their role in training teachers, which is universally regarded as being of critical importance, the colleges and universities have little influence on instructional innovation in elementary and secondary schools. Very few of the local programs studied during the survey had been suggested, planned, evaluated, or even observed by college personnel—on either a paid or voluntary basis.

The colleges and universities are not well organized to exert direct influence on elementary and secondary programs and do not consider this to be one of their basic responsibilities. Institutions of higher learning are organized primarily to teach regular courses of predetermined content and length.

For instructional shifts of major scope, it is necessary to deal with the entire staff rather than with individual teachers. College courses designed for a collection of individuals must teach information and skills which will be useful in a variety of school settings. They cannot be directed narrowly toward the needs of one particular system, the form in which they would be most useful to a school system adopting a new instructional program.

No one in the profession understands the necessity for continuous in-service education as well as the college personnel who are providing pre-service education. They said quite frankly, "We do not pretend to turn out a finished product." They assert that the colleges do not attempt to equip the prospective teacher with specific instructional techniques, but concentrate on developing a general professional wisdom from which he can draw the specific techniques that he needs for any given task. Actual instruction in specific techniques was said to be the responsibility of the schools which employ the college graduates—a responsibility which most local schools patently are unable to meet.

Despite college disclaimers of any serious effort to teach specific techniques, the writer came away from the interviews with the strong impression that certain specific techniques are indeed taught but that they can be better described as "currently in vogue" rather than as "basic professional wisdom." These are exemplified by methods of using a textbook, making lesson plans, and assigning homework. After close study, the writer concluded that teacher-education programs do not train teachers in how to carry out new instructional processes until those processes are in general use.

Professional Associations. The professional associations are the most effective communicators, not primarily because of their publications and programs, but rather because of the opportunities they provide for informal contact among individuals at meetings. (A talk with a trusted friend who has himself experienced a new program is very close to an actual visit in its persuasive effect.) Notwithstanding their effectiveness compared to other agencies, the communication which the associations provide is random, disjointed, overlapping, and unfocused.

College-Affiliated School Study Councils. The college-affiliated school-study councils act primarily as communicators of information. They are rarely tied in directly with the process of changing the instructional approaches used in their member schools. These councils are generally poorly financed and weak in influence.

The heart of the problem seems to be that the study councils are usually managed by college personnel interested chiefly in discovering new information and paid for by local school systems interested chiefly in learning to do in the best way what is already known. The result is an enterprise so underfinanced that it can perform neither function very well.

Private Philanthropic Foundations. The great contribution of the private philanthropic foundations in education, as in other fields, is that they have created conditions under which able people could be freed to concentrate at least temporarily on limited functions. Some promising new programs have resulted. Nonetheless, it is difficult for private foundations to promote the spread of any distinctive instructional approaches that they have sponsored because of the professional suspicion aroused by any new approach, particularly one which is being actively advertised.

Commercial Organizations. The commercial organizations, such as textbook publishers, are extremely powerful. When they promote an instructional change, a great wave of influence sweeps over the schools. On the other hand, once they begin to market a given product, they serve as powerful inhibitors of change because they seek volume distribution and repeated sales of the same product.

All in all, the commercial organizations tend to be a unifying influence over curriculum content and instructional methods not only on the state-wide level, but nationally as well. They seem to hold the better schools and the better teachers short of the point they could reach, while taking poorer school systems and less capable teachers further than they would otherwise go.

The Three Phases of Instructional Innovation

The key conclusion of this study is that the design, the evaluation, and the dissemination of innovations are not at all the same. They are three distinctly different processes. The circumstances which are correct for any one of them are essentially wrong for the others. They cannot be reconciled. Moreover, most of the persons who work well in one phase do not work well in another.

The hallmark of the ideal design setting is freedom; the hallmark of the ideal evaluation setting is control; the hallmark of the ideal demonstration setting is normality.

Phase 1: Design. The ideal circumstances for the design of an improved instructional approach are artificial, enriched, and free. At their best, they provide a group of highly intelligent people, a somewhat limited problem, time to concentrate on a solution, ample money and resources, freedom to try almost anything, the likelihood that the solution will be used somewhere, and the prospect of personal recognition if the problem is solved. The more artificial, enriched, and free the setting, the more distinctive the innovation it is likely to produce.

Phase 2: Evaluation. The ideal circumstances for the evaluation of a new instructional approach are controlled, closely observed, and unfree. At their best, they provide conditions in which the forces that might influence the success of the new approach can be controlled when possible and kept under close surveillance when actual control is impossible. The freedom which is essential in searching for a good design is destructive in making a good evaluation.

Phase 3: Dissemination. The ideal circumstances for the dissemination of a new approach through demonstration are those which are ordinary, unenriched, and normal. At their best, they are exactly like the everyday situations in the observer's own school and community. Anything which the observer could label "abnormal" or "unrealistic"—such as the enriched conditions necessary for good design or the controlled conditions necessary for proper evaluation—robs the observed program of persuasive effect.

The most formidable block to instructional improvement today is that education—unlike medicine, agriculture and industry—fails to distinguish the three phases of change: design, evaluation, and dissemination. The campus laboratory schools offer the most spectacular example of trying to put everything into one shell. They are expected, at the same time and in a single setting, to invent new programs, to evaluate them, to demonstrate them for the purpose of persuading the public schools to do likewise, to show the best now-known ways to teach, and to be a safe place for professors' youngsters to go to school. All these functions cannot of course be performed at one time in one setting. The campus schools respond by demonstrating the best known ways to teach because that function fits in with their responsibilities for teacher training.

A Word about Basic Research in Education

Another serious block to instructional improvement is the fact that education fails to support adequately the basic research which should precede the design of new instructional programs.

Basic research in education is the study of the circumstances, processes, and effects of human learning. The basic research effort may well be "useless" in the sense that it has no immediate application to schools as educational institutions. Ultimately, when converted into instructional procedures, it is extremely useful.

In a logical sequence of events, basic research should be labeled "Phase 1." It should precede and help generate the design effort. However, the writer found that most innovation does not flow methodically from basic research, but is undertaken quite independently. Thus he bowed to the facts and labeled program design "Phase 1." It is his opinion, however, that design efforts should draw upon basic research into human learning and that the best designs will come from the conscious, deliberate, planned translation of that research into programs for teaching.

The Solution

Because the problem of change is large, the solution must be equally large. It should deal realistically with the conditions which now exist and not attempt to do the impossible, should draw funds from the most appropriate sources and give responsibility to those best able to take it, and should use the effective structures already in existence but abandon those which are not effective.

In Organizing New York State for Educational Change, the writer has recommended a solution he believes is big enough to solve the problem in that state. The heart of the plan is the creation of special, separate circumstances for the design, evaluation, and dissemination of new instructional programs. It seems probable that this plan has implications for other states.

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A PHILOSOPHY OF RELATIONSHIPS FOR STATE RESEARCH AND DEVELOPMENT

by
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Much has been said about the gap existing between research and practice, and we are reminded of the old Vermont farmer who, when asked to cooperate in some agricultural research, commented, "Shucks, I ain't farming half as well as I know how to now!" Well, our thesis concerns the need for more of both research and practice, and suggests the pressing urgency of systematic organization and a thorough understanding of the processes involved in Research and Development.

According to Charles F. Kettering, research is a high-hat word that scares a lot of people. It needn't. It is rather simple. Essentially, it is nothing but a state of mind--a friendly, welcoming attitude toward change, going out to look for change instead of waiting for it to come. Research for practical men is an effort to do things better and not to be caught asleep at the switch. The research state of mind can apply to anything: personal affairs or any kind of business, big or little. It is the problem-solving mind as contrasted with the let-well-enough-alone mind. It is the composer mind instead of the fiddler mind. It is the tomorrow mind instead of the yesterday mind.

Research is theoretical analysis, exploration, and experimentation directed toward the increase of knowledge, and thereby the power to control phenomena.

Webster defines "research" as "...studious inquiry...critical and exhaustive investigation or experimentation having for its aim the revision of accepted conclusions, in the light of newly discovered facts." The word "research" is so widely used with such varying connotations that great confusion results. Research can be defined as the application of human intelligence in a systematic manner to a problem of which a solution is not immediately available.

Webster describes "development" as "a step or stage in growth, advancement; hence, an event or happening."

There is today an increasing awareness and sense of urgency for research and development (improvement if you will) in education. In many areas we find persons seeking, striving, straining, clamoring, thirsting, imploring for change to meet the needs of today. This applies to all of education, including most certainly that which you represent--vocational-technical education.

Vocational programs were for many years predominantly characterized by a high level of excellence--and were generally so recognized. The interest and attendance at this conference testifies of your belief that we need now devote special attention toward organizing for research and development. Behind this must have been--among other things--the feeling that our field of mutual interest needs some new vigor, some variations of old ideas, some brand new ideas, and widespread willingness to adapt to the needs of changing times.

I suggest the problem which confronts you is of such priority and importance as to merit well-planned organization, systematic innovation, flexibility, and adaptiveness in your research and development activities. As yet, there is little--or, at most, inadequate--assurance that our developing programs will possess these essential qualities.

My assignment today concerns the challenge of organizing for change in vocational-technical education. Let me begin by focusing your attention on the overall setting and talking about state departments of education.

State divisions of vocational education are important parts of state departments of education, and that which characterizes the latter generally characterizes their divisions of vocational education.

Perhaps more so than ever before, it is today essential that state departments of education be strengthened. This is supported by the philosophy of the present federal administration as reflected by various actions, the Elementary and Secondary Education Act of 1965 being the most recent.

Not long ago James Bryant Conant said, in referring to policy-making for the public schools, "What is needed are strong state boards of education, a first-class chief state school officer, a well-organized state staff, and good support from the legislature." Conant has also noted that in some instances, "the state education departments, though possessing considerable formal authority, are capable of little more than the performance of routine duties." In commenting further about the determination of educational policy in the United States, he says,[1]

> "Educational policy in the United States has been determined in the past by the more or less haphazard interaction of (1) the leaders of public school teachers, administrators, and professors of education, (2) state educational authorities, (3) a multitude of state colleges and universities, (4) private colleges and universities, and (5) the variety of agencies of the Federal government, through which vast sums of money...have flowed to individual institutions and the states....It is my thesis that such a jumble of influential private and public bodies does not correspond to the needs of the nation..."

Dr. Conant also points out the need for strengthening state departments when he said,[2]

> "Without appearing to belabor an obvious point I do wish to emphasize how reformers intent on using the Federal power have repeatedly been forced to use what I have called 'Federal bribery' to accomplish their purposes."

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[1] Conant, James Bryant, Shaping Educational Policy, New York: McGraw-Hill, 1964, p. 31.

[2] Ibid., p. 120.

Institutions of higher education have long excelled in many phases of education, but theirs is not the business of setting policy for public schools, or for providing direct leadership to them. They have rightfully had a monopoly on undergraduate and graduate work, but they have not and should not assume or be delegated state-wide or local responsibility for public education. This is neither philosophically desirable nor legally in order. The colleges and universities, through the consultant activities of professors, have made efforts of some significance to provide assistance to local schools; however, this has not been a major or top-priority concern of higher education, and it is grossly inadequate for many reasons.

Constitutional and statutory (as well as logical) responsibility for the public schools rests with the state which has established an agency with state wide responsibility for this purpose. At the 1964 annual conference of the Council of Chief State School Officers, Conant said that as recently as five years ago he would have advocated that local boards were the keystone to educational policy and that state departments of education were just to be "tolerated." He went on to say to the chief state school officers, however, "It is now clear to me that the jobs which you hold are or should be the key positions in education and not the structure of public education...in the United States."

As long ago as 1957 John Guy Fowlkes[3] of the University of Wisconsin, in referring to state departments of education and the chief state school officers, said, "These are the agencies and officials who, more than any other educational organizations and workers, have responsibility for and work with, to varying degrees, all levels, kinds, and forms of public education in our country."

There is an increasing concern nationwide about the strengths, capabilities, and limitations of state departments of education as they currently exist. There is general recognition that the weakest link in the educational triad of local schools, higher education and the state department of education is most often the latter. Frequently, one hears criticism that these departments not only fail to promote changes for improvement in education, but they also obstruct the efforts of others.

Techman[4] concluded that the present standards of state departments are not able to keep pace with postulated new practices, and little leadership was found.

The average state department of education[5] has 75 professional staff members available to work on educational problems and programs. Such a department works with 425 school districts, including 1,003 elementary schools, 80 junior high schools, and 220 high schools. These are staffed (1963-64) with 10,827 elementary teachers, 1,916 junior high teachers, and 5,401 senior high teachers. There are in addition 170 superintendents, 42 assistant superintendents, 633 elementary principals, 74 junior high principals, and 159 senior high principals. In summation, the 75 state department of education staff work with 1,303 schools and about 20,000 local school people--for the purpose of maintaining standards, teacher and administrator training, and the general improvement of education including buildings, methods, and materials for teaching.

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[3] Thurston, Lee M., and Roe, William H., State School Administration New York: Harper Bros., 1957, p. vii.

[4] The Influence of State Departments and Regional Accrediting Associations in Secondary School Experimentation, The Ohio State University, 1962.

[5] Will, Robert F., State Education, Structure and Organization, p. 33.

How can any state department of education staff be effective with a ratio of 75 SDE persons to 20,000 local school people? Some state department consultants[6] estimate their average "visit" to schools to be one half-day each seven years. A few are able to approach the level of one visit in each two-year period. Obviously, this precludes reliance upon the procedure of working with individual teachers--especially when one takes cognizance of the time required for desk work and travel. It would be not only impractical, but also unrealistic and undesirable to attempt to increase SDE staff to a number that could satisfactorily (under traditional procedure and organization) meet the challenges and effectively influence change for improvement.

Beginning with the precedents set by Horace Mann in Massachusetts, state departments of education have quite adequately performed such tasks as record keeping, disbursement of funds, inspection, compliance checking, and enforcement of minimum standards. There is today another function which is sorely needed by public education. That is one of service and leadership to point the direction for change and improvement in education, and to assist with its implementation in the public schools. (This does not preclude continued performance of services in record keeping and compliance checking, but these should constitute a minor function rather than the raison d'etre.) Instead of spending 90 percent of their time on inspection and compliance checking, and 10 percent on promoting specific change for improvement, state departments should reverse the ratio and devote 90 percent to leadership for change.

The Need for Research and Development in Education

The average citizen today recognizes that "R and D" stand for the two most important words in American industry--Research and Development, which form the basis for most of the outstanding achievements of our country's industries. Companies which show the greatest progress and market the largest number of new products are those which budget generously for research and development, establish responsibilities, and organize accordingly. Many of our outstanding growth companies pour back into research and development as much as 10 percent of their net incomes. The automotive industry is a prime example. How long could (or can) any of the leaders in this industry compete without continual research and development? A common story among the most active industries is that more than half of their new products are less than ten years old. Were it not for strong research and development programs, companies in the fields of electronics, drugs, and metal products (to name just a few) would soon be out of business.

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[6] Discussions of the writer with personnel in Oregon, Washington, and Wisconsin state departments of education in January and February, 1965, and with each of the 50 chief state school officers and staff members during 1959-60.

Professional people, such as the doctor, the pharmaceutical worker, and the dentist, must carefully follow new research in order to keep abreast. We are most critical of our professional people who fail to make use of the findings of research.

The U. S. Department of Agriculture, the land-grant colleges, the Agricultural Experiment Stations, the county agricultural staffs (agents) and a multitude of farmers cooperate in performing the essential tasks of research and development in agriculture. These agencies and individuals are responsible for research on agricultural problems, whether local, state, national, or international, and have a mutual interest in achieving solutions and improvements. Some federal monies are utilized, but the major amount of the activity is supported by state funds. This widely dispersed research effort within each state is coordinated and correlated by a state agency to bring about overall balance, avoidance of gaps, and a balanced attack on agricultural problems in general.

The technological advances which have resulted in agriculture and industry have not come about spontaneously or haphazardly. They originated in deliberately planned, carefully organized, and adequately financed programs of research and development. The methods, organizations, and procedures utilized in American industry and agriculture are the objects of worldwide admiration and emulation.

We are now allocating huge sums of public capital to research in education, but how well are we organized? The truth of the matter is that, excellent though our basic research has been, far too much of it remains on the shelves and in the pigeon holes gathering dust. The necessary follow-through activities and implementation have been sadly neglected.

Currently, we have at our fingertips sources of financing far greater than ever before. We have not previously organized for change or systematic innovation--but now we must or fail in our endeavor.

The Change Process and Implications for Divisions of Vocational Education

Generally recognized today is the need for accelerated change to keep education programs and practices in tune with demands created by the rapid expansion of knowledge, an intensely competitive society, the expanding population, new ways of living, and the changes created by increased automation.

Too often there is undesirable competition between agencies or institutions in different levels of education, and sometimes apprehension and resentment of each other's actions--or lack of action. This is little short of calamitous, in view of the magnitude of the over-all task in education and need for improvement.

Comprehension and agreement concerning individual and joint responsibilities are essential if we are to effectively influence change for improvement in education. Changes in education are inevitable, whether planned or not, and it behooves us to actively endeavor to influence the process.

The research work traditionally done by the colleges and universities has been generally excellent insofar as basic research activities go; however, there is great need for applied research for activities such as program invention, field testing, dissemination, demonstration, and implementation. The latter activities (frequently encompassed by the word "research") are appropriate functions of the State Department of Education and of local schools, as well as sometimes higher education.

The divisions of vocational education should have prime responsibility for isolating major problem areas and then coordinating the efforts (sometimes subcontracting) to attack problem areas in education. Some of the problem areas can be attacked best by local schools. Experience has proven that they will not be so attacked, however, unless the State Department of Education, with the aid and cooperation of many schools and colleges, identifies and spotlights them, and then exerts coordinating leadership to bring about improvement.

Certain kinds of research and development may properly be done by the division of vocational education. The division should arrange for local school and higher education personnel to devote energies toward achieving solutions to the problem areas which have been isolated and defined. The division has major justification to concern itself with many kinds of research and research-related research, but much less with basic research.

It is neither desirable nor feasible for personnel of most local schools to thoroughly acquaint themselves with the technicalities (red tape) and general requirements. Likewise, it is equally or more undesirable to train or acquire local school personnel already skilled in the intricacies of the necessary research design.

The divisions of vocational education need personnel skilled in research design to provide state-level service for public schools (and to a lesser extent to higher education)throughout the state.

Local schools are the logical setting for many applied research activities and field testing. They constitute the focal point for implementation.

Commissioner Keppel, in his letter dated April 9 and addressed to state departments, has detailed means that states can follow in applying for funds to establish a state program of research and development in vocational and technical education. State departments, universities, and even private organizations have vital roles to play in this essential function. The details of implementation may vary to some degree from state to state, but the need and the motivation is similar the country over.

Essential to the successful establishment of research and development programs is a thorough understanding of the Process of Change, and agreement concerning roles.

The chart* (and accompanying explanation, see pages 37,38 and 39) which follows details our philosophy pertaining to specific division of responsibilities for the several areas of research and research-related activities.

Summary

We can summarize by saying that, although we have dealt with the several areas (problem definition, research, program development, field testing, dissemination, and implementation) to some extent separately, we recognize that these are overlapping and frequently some are entirely omitted from consideration. Because of the varying responsibilities and because the many activities cannot be separated into neat little cubicles, it is highly imperative that the three agencies (local schools, higher education, and the Department of Education) always be involved and cooperating regardless of the immediate area concerned. Similarly, the division of vocational education should be continually communicating and cooperating with other divisions of the department.

Of basic importance is some understanding of the change process. Implementation or action will probably not ensue, unless we specifically plan and create a favorable climate for change.

Involvement of many persons is a must, and each needs adequate comprehension of his responsibility and authority.

State personnel are too frequently prone to believe that their superior levels of training, position and experience (sometimes referred to under the term prejudices) entitle them to consider their own opinions sacred -thereby prohibiting flexibility and obstructing development of the kinds of programs needed in vocational-technical education today.

At long last, the people of this country have come to recognize the basically rigid and non-comprehensive programs existing in the great majority of our secondary schools. These programs, primarily college-prep in nature, resulted from rigid adherence to the concept that the supreme goal of education could only be matriculation in the conventional 4-year institution (college or university).

Now that we have support and resources to improve education for the youth of this afternoon and tomorrow, it behooves us to carefully and thoroughly organize for Research and Development, and to avoid some of the obvious errors of the past.

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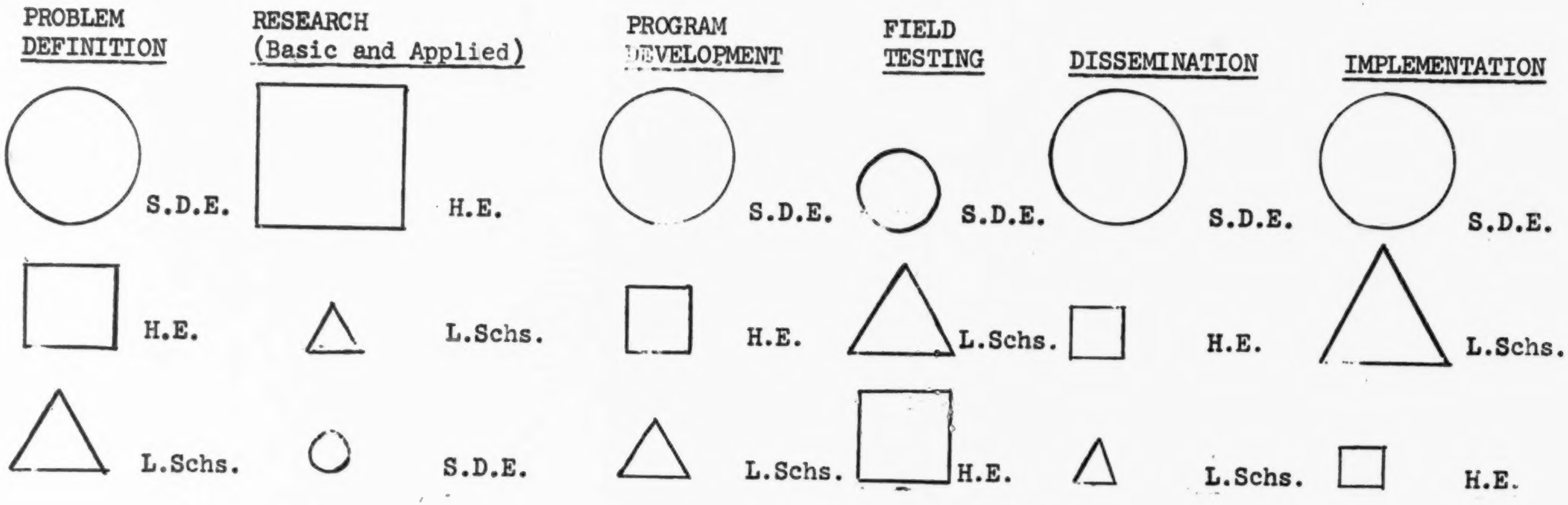
*A synthesis of individual discussions and workshop activities involving Dean Lindley Stiles, Drs. Philip Lambert and John Guy Fowlkes of the University of Wisconsin; Dr. Egon Guba of The Ohio State University; Dr. Jack Culbertson of UCEA; Dr. Keith Goldhammer of the University of Oregon; and others. Refined from Cooperative Research Project #F-032 (Principal Investigator, Allen Lee), 1964.

A Flannelboard Presentation:

A TAXONOMY OF ACTIVITIES INVOLVED IN EDUCATIONAL CHANGE IN PUBLIC SCHOOL PROGRAMS*


PROBLEM DEFINITION
S.D.E.
H.E.
L.Schs.
RESEARCH (Basic and Applied)
H.E.
L.Schs.
S.D.E.
PROGRAM DEVELOPMENT
S.D.E.
H.E.
L.Schs.
FIELD TESTING
S.D.E.
L.Schs.
H.E.
DISSEMINATION
S.D.E.
H.E.
L.Schs.
IMPLEMENTATION
S.D.E.
L.Schs.
H.E.

1. Problem Definition is an area for which the state department of education should fulfill the major role after thorough communication and consultation with local schools and higher education.

2. The major role for basic Research should continue with higher education; however, it is vital that local schools and the state department of education have minor involvement.

3. The state department of education should have the major leadership role for Program Development; however, it is essential to have significant involvement of colleges and universities and local schools.

4. In Field Testing the three agencies generally should have equal involvement.

5. In Dissemination the major leadership role should be carried by the state department of education; however, local schools and institutions of higher learning should fulfill supporting roles.

6. In Implementation the major roles should be with local schools and the state department of education because the Constitution gives responsibility to the state, which in turn delegates some. Higher education should play a minor role.

* CRP F-032, Allen Lee, Principal Investigator

(Flannel Board Presentation)

	PROBLEM DEFINITION	RESEARCH	PROGRAM DEVELOPMENT	FIELD TESTING
PURPOSE	Establish Priority	Discover Truth	Structure & Vehicle	Try out Empirically
EFFECT ON CHANGE	Focus Attention	Give Direction	Facilitate Change	Determine Local Usefulness
ACTIVITIES	Observe Confer ___ ___	Analyze Inquire ___ ___ Synthesize Describe	Create Devise ___ ___ Construct Fabricate	Evaluate Adapt
APPRAISAL CRITERIA	Reactions	Validity	Potential for Meeting Needs	Efficiency Usefulness

(Flannel Board Presentation)

	DISSEMINATION	IMPLEMENTATION
PURPOSE	Provide Visibility	Improve Education
EFFECT ON CHANGE	Provoke Interest	Incorporate Change
ACTIVITIES	Advise Circulate	Use Available Resources
APPRAISAL CRITERIA	Transmission Effectiveness Degree of Comprehension	Achievement of Goals

A RATIONALE FOR THE ESTABLISHMENT OF A VOCATIONAL EDUCATION RESEARCH STRUCTURE

by
Herschel T. Lester, Jr.
Director of Research
Division of Vocational Education
University of Georgia

> "If a man does not keep pace with his companions, perhaps it is because he hears a different drummer."
>
> Henry David Thoreau, 1906

Many of the functionaries charged with research fructification in vocational education encounter many circumambient adversities and seemly urgent priorities which retard or facilitate the process of structuring and conducting educational research programs. It is the purpose of this paper, (1) to explore the current situation in terms of useable research structures, (2) to outline procedures for implementing research findings, and (3) to suggest plans for future research structures.

CURRENT RESEARCH STRUCTURES

Without a doubt, these are challenging days for persons who administer or conduct educational research for it appears that we are truly entering an era when research is to become an integrated part of the total educational program. This statement is already true regarding some phases of education; however, it would appear that vocational education is on the threshold of entering this era. In the past, most completed research as related to vocational education appears to have provided a sublimenal stimulus to the total program. This may be due to the fact that too many studies were poorly planned. This procedure encouraged little interlocking departmental, college, university, or state coordination. The end results of this approach has produced studies in which perfunctory and haphazard research methods were employed. In fact, it would seem from a casual observation, that much of the completed educational research might be found lacking if evaluated using these criteria. Many conditions or factors may be responsible for some of these insufficiencies, such as; (1) lack of interest on the part of educators, (2) lack of "hard money" on a long-term basis, (3) lack of administrative understanding and corroboration, (4) rigid university and state department policies and regulations, and (5) federal programs which do not even attempt to understand the foregoing statements. Perhaps the problem of the first magnitude that is easily recognized by vocational educators and is evident in nearly all research organizations and structures is--Time. Individuals who conduct vocational research or design research proposals do so with little encouragement or adjustments in administrative duties or in the number of classes or students taught. In short, research is postponed until all other duties are completed and all monies spent. Due to this haphazard and lack of support approach, many of today's educators are learning little respect for research findings.

Graduate Research

Several well known patterns or approaches to research may be identified with the one familiar to most, being "Graduate Research." The scheme or method employed is to take advantage of "captive or slave labor" to conduct vast research studies with half vast qualified personnel. In fact, most graduate studies attempt to meet minimum specific requirements of a graduate school, while others meet only those requirements of a professor. These studies, in some cases, have been undertaken using poor research procedures and methods to "prove" certain philosophical beliefs, to "confirm" personal biases in regard to educational procedures, and to "attack" foregone conclusions. In the past, these types of studies often found funds, personnel, and time. How much we learn and are able to use from this approach is questioned and opened to discussion. It would appear that this scheme of conducting research has encouraged little hybridization or cooperation between departments, while in fact, in some cases coordination between professors within their own departments has been very limited. This method also discourages administrators from using the results as it is easily seen that problems have been approached on a non-random and/or limited scale. In addition, this approach has encouraged students to reach unjustified conclusions and encouraged students to dislike research. These and many other pitfalls concerning graduate research could be overcome by providing adequate full-time research grants in which graduate students or others could undertake a research internship at full salary for an extended period.

Paradigm Structures

A structured research program cannot be defined as just a survey, a graduate problem involving a thesis or dissertation, or a staff study of a small area. However, in the past this definition has often been applied by vocational educators to research areas in attempts to obtain data that could be used to design, develop, and evaluate vocational programs. It is very evident, upon close examination, that many past studies collected woefully inadequate data. These data were analyzed and developed into clouded perceptions and concepts that could not be translated into useable form. Research should be a procedure or method which people may use as an attempt to enter the doorway of knowledge in vocational education. The approach should be an investigation beyond where we are at present in areas which few have ever visioned in their thinking and none have planned for in their programs. It includes the unknown, the new, the unexplored, and charting of a destiny for vocational education, and in many cases, a study of our "holy golden bovines." This approach to research is useable throughout all aspects of education, but it should be considered imperative for vocational education, as training programs of high quality must be projected to meet the future needs of a rapidly changing technological society.

Structured research efforts will not just happen, on the contrary, it will require untiring leadership efforts of state departments of education, universities, and federal agencies as attempts are made to develop this phase of vocational education. Several problems must be overcome before long range planned research programs may be undertaken. Some of these may be outlined as follows:

1. Adequate time must be made available.
2. Adequate permanent funds must be made available.
3. Administrators and teachers must be convinced of the value of planned research.
4. Personnel must be adequately trained in techniques.
5. Personnel and students must be willing to conduct programmatic research.

To meet situations now developing in vocational education, we must structure research that will provide comprehensive and flexible guidelines to broach and inaugurate programs which will prepare individuals to enter upon, make progress in, and become adjusted to the world of work. If we are not to be passed by in the race of progress, we cannot rely on trial and error, catch as catch can, but we must make planned educational changes discovered by adequate research programs. The paradigm under discussion should focus with explicit sharpness on the behavioral characteristics of teachers and students. These teachers and students should be studied in terms of how to develop new educational concepts and perceptions, upgrade course content, determine the necessary prerequisite knowledges and attitudes needed to be successful in vocational programs, and develop new instructional methods and procedures.

Federal and State Morphic

If planned research programs are to be designed and structured to broach the past void of research findings, certain existing conditions must be modified. Those who administer federal educational research programs must change present funding procedures for it appears that projects which are submitted and designed by persons who have insufficient experiences, but who have academic backgrounds in certain disciplines, received priorities. It should be made crystal clear to all these persons that federal research monies are appropriated under legislative authorizations; therefore, the monies have been allotted for specific purposes. In short, vocational education research monies must be made available to focus upon research problems which are directly related to the stated objectives of the 1963 Act. It must be remembered that all public monies must be accounted for in terms of the specific purposes for which the monies were appropriated, and not in terms of what a group of federal administrators, panel members, or others may deem.

Within the last few months, much time and money has been spent by federal officials to conciliate and emphasize the need for mutual cooperative efforts between vocational educators and persons who represent related disciplines which appear to logically support vocational education, i.e., anthropology, economics, education, political science, psychology, and sociology. These efforts have been in terms of a conjunctor of vocational educators and persons of other disciplines to broach research problems on a mutual basis. Over a period of years, this trend may be beneficial to vocational education. This philosophy is very benevolent to the "scholarly disciplines" to say the least. Much can be said for the hybridization of these disciplines with vocational education, but much thought and study should be given to the plan before unmitigated abandonment is attempted by our self-appointed leaders.

With today's trends within these so-called "scholarly" disciplines being conditioned on the assumption that dichotomies (i.e., night-day, black-white, and fabrications-truth) are representatives of reality, it would appear that extreme caution should be exercised by persons doing research concerning learning as all vocational education learning experiences do not appear to be dichotomies. These disciplines overly stress the use of empirical data deemed so necessary by some for scientific study. The postulation that anything not directly observable is not a fit subject for scientific inquiry should be open for much discussion as a plausible theory. In fact, it may not even be tenable as an assumption. It does not appear to perturb these pharisaical persons that much of the data of vocational education is not directly observable and is not known only through long-term effects. For in study after study, these so-called non-vocational educators continue to exhibit statistics which are overly refined to determine differences between what a person means when the answer is "very much" instead of "much." These types of over-designed studies attempt to formulate universally applicable generalizations; however, this approach is likely to provide an inadequate orientation to the research worker in a field just beginning to systematize its knowledge.

Explore the assumption--"Problems of learning and of motivation are basic problems to vocational education." This same statement is also a major preoccupation of psychologists and general educators. This same type of crossroads situation has been faced in the medical profession in terms of: "How much of the needed research should be done by the medical research physician and how much should be done by non-medical researchers?" Large numbers of sociologists, anthropologists, educational psychologists, and other non-medical research specialists, are being employed within the field of health research. However, in nearly all undertakings, medical research specialists direct the overall program along medical objectives. Several assumptions may be advanced as to why the medical profession employs this approach, such as, (1) fear that the non-medical research will take off on a tangent, (2) lack of medical experience which is basically needed to define and carry out the research that must be done to meet program objectives, (3) perhaps, in order to obtain federal funds these persons must be employed or the projects will not be approved, and (4) lack of trained medical research personnel.

It would seem from the prevailing philosophical approach to research that these so-called research specialists should be able to "draw from the proverbial hat" a solution to all problems, especially in the areas of vocational education. Somehow, it seems that too many federal personnel feel that research sociologists, psychologists, etc., qualifications Ph.D.--can by magic means, sidestep all the critical questions relating to criteria, problems of data collections, and existing programs, especially as related to students, teachers and other school environmental settings. This is the most gross injustice and falsification of thinking that can be imagined. Even the most capable senior research persons have had great difficulty in formulating quality studies in areas of learning and motivation.

PROCEDURES FOR IMPLEMENTING FINDINGS

It has been recognized by almost all vocational and other educators and administrators on local, state, and national levels that need for dissemination of research findings should have first priority. However, this has not been the case. Most efforts at dissemination of research findings have been uncoordinated; for example, dissemination of proven innovations, such as, materials regarding programmed learning, newer methods of audio-visual aids, and computer technological studies have not even been attempted.

Several other innovations and research findings which have not been disseminated could be listed. It is mandatory that careful attention be given to the flow of information to classroom teachers if research findings are to have immediate and desired effects on education practices. The usual means of communicating research findings, (i.e., journal publication and presenting papers at professional meetings) are too slow and ineffective for most teachers. Other media besides print, should be used, such as: (1) educational television, (2) computer instruction, using the IBM or similar systems, in a series of schools, (3) radio, (4) demonstration programs in varying types of schools on a large scale, and (5) the use and involvement of faculty members from public schools and colleges in the planning and carrying out of specific research studies. In fact, most research has been primarily oriented toward the controlled conditions of the laboratory and not toward classroom educational environments. Some thought and effort should be given to the future needs for research aimed at application of findings related to methods and basic research, including use of important learning variables. These undertakings should be in terms of basic concepts and principles as related to the practical problems of the uncontrolled environmental classroom situation. This approach could also provide a much-needed bridge between learning process personnel interested in laboratory controlled research on the one hand, and those interested in actual classroom situations on the other. This applied research and developmental approach may have several outcomes, i.e., a useable teaching method or device, film or an educational program of superior quality.

The foregoing is not meant to downgrade basic or exploratory research or hypotheses testing, but to evaluate in educational environments these new-found methods and techniques. Other methods which should be looked upon in a favorable light are exploratory work in non-data producing activities as needed in critical reviews of literature, generation of theory and other similar activities. Demonstrations of new innovations should be provided for purposes of affording teachers, administrators, and the public an opportunity to see the new method or system. Of course, the well known pitfalls of "demonstration researching" must be overcome, i.e., an innovation versus some unidentified conventional method, lack of basic control data, short-term demonstration programs, and the use of one or two teachers to "prove" the innovation. If demonstrations are to be undertaken, sound research methods should be used based upon reflective thought and a thorough review of the literature.

PLANS FOR THE FUTURE

The foregoing sections outline many questions which are most difficult to answer. An attempt must be made to structure a planned research program that will provide valid data in which vocational-technical education programs may be founded. Briefly, the following procedure may be used as a beginning place:

1. Establish a procedure whereby one person within the state may coordinate all research undertaken in vocational education.

Duties of the individual would be as follows:

a. Consult with research personnel or interested people in planning, designing, structuring and undertaking of research projects.

b. Collect and disseminate information on research procedure.

c. Collect and disseminate research publications.

d Secure necessary administrative approval for undertaking projects.

e. Secure funds for carrying out studies.

f. Accept completed projects.

2. Establish a State Research Committee to review all proposals and to establish funding priorities for submitted proposals. The Committee should point out significant research problems and assign priorities and responsibilities for making the studies.

This Committee should have as members the following individuals:

a. One teacher educator from each vocational service.

b. One supervisor from each vocational service.

c. State director for vocational education.

d. Dean of the college.

f. Director of research.

Other duties of the State Committee may include:

a. Plan a comprehensive, long-range State research program.

b. Provide means for acquainting teachers, administrators, and others with pertinent research findings.

c. Involve research specialists and consultants in other fields.

d. Establish needs for additional qualified research personnel.

It should be pointed out that this procedure is based upon the premise that a permanent research budget will be established. Without this budget, qualified personnel to draft proposals and direct studies will be hard to procure. In addition, without a permanent budget, qualified graduate students cannot be recruited who are capable of conducting quality studies for an extended period of time.

3. Establish individual research committees by services similar to the AVA research committees. These committees are to be made up of teachers and other selected people and will assist in pointing out the problem areas.

SUMMARY

The purpose of this paper has been to (1) explore the current situation in terms of useable research structures, (2) to outline procedures for implementing research findings, and (3) to suggest plans for the future.

In the past, most completed research as related to vocational education appears to have provided a sublimenal stimulus to the total program. This has been caused by many factors; however, the factor which stands out, and is easily recognizable by vocational educators, is--Time.

Graduate studies have been used in the past to conduct vast research studies with half vast qualified personnel. In fact, most graduate studies have been almost useless as a tool in planning vocational programs. It should be pointed out that structured research efforts will not just happen, on the contrary, it will require untiring leadership efforts of state departments of education, universities, and federal agencies to develop this phase of vocational education.

If planned research programs are to be designed and structured to broach the past void of research findings, certain existing conditions must be modified. In short, vocational education research monies must be made available to focus upon research problems which are directly related to the stated objectives of the 1963 Act. Much can be said for the hybridization of these disciplines with vocational education, but much thought and study should be given to the plan before unmitigated abandonment is attempted by our self-appointed leaders.

Implementing research findings has been recognized by almost all vocational and other educators and administrators on local, state, and national levels. It is mandatory that careful attention be given to the flow of information to classroom teachers if research findings are to have immediate and desired effects on education practices.

Plans for the future must be organized around a structure of planned research efforts. These efforts should include: (1) coordination of research efforts, (2) establishment of some type of state review panel must be established, and (3) structure individual research committee by services.

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OCCUPATIONAL EDUCATION IN RESEARCH

The New York State Education Department's Structure

by
Alan Robertson
Associate in Vocational Education Research
New York State Department of Education

New York State has pioneered the appointment of personnel to its staff to work full time on research in across-the-board vocational education. As early as the Fall of 1962, plans were made and a position approved in the budget of the Vocational Education Instructional Services Office to add such a position to the Office of Research and Evaluation.

In a recent survey of State and U. S. Dependency Education Departments (January, 1965) conducted for the Research Committee of the American Vocational Association, it was determined that this arrangement was unique in the fifty states. While it was true that several State Boards for Vocational Education had assigned research duties either full or part time to Vocational Education staff members, or observed the practice of channeling assignments to a specific member of the State research staff (who could be housed at a State University), the New York State Department of Education's provision for vocational education research was unduplicated.

In essence, it provides for a full time research professional with the same basic research qualifications as other professionals of the same grade, broadly knowledgable in vocational education although not a subject matter specialist, and appointed from a Civil Service list as a research associate in the Office of Research and Evaluation. Salary and travel expenses are carried on the Vocational Education state staff budget, and until the beginning of fiscal '66 were paid for through Title I, George-Barden Act. Supervision of vocational education research staff, is, however, under the Associate Commissioner for Research and Evaluation through the Chief of the Bureau of School and Cultural Research and the Director of the Division of Education Research.

Major work assignments and duties generally originate with the Assistant Commissioner for Vocational Instructional Services, i.e., the State Director for Vocational Education, and are channeled either directly by him or via the Associate Commissioner for Research and Evaluation to the Associate in Vocational Education Research. Excellent professional relationships and mutual regard between the Chief Administrators of the two offices have made a major contribution to the smoothness of operation of this dual arrangement.

The advantages of this structure lie in that, for an expenditure for one professional staff salary and expenses, Vocational Education thus has the full resources and potential of all of the other Research and Evaluation staff behind its own man on the team. As illustrated by the accompanying diagram showing the personnel structure of the Research and Evaluation Office, a variety of specialized research talent is thus available for formal project assistance or informal consultation on vocational education research problems. On the research staff, are specialists in research in the social sciences and social structure, on elementary, secondary, and higher education, in experimental design and program evaluation, in educational psychology and in the application of statistical techniques to research problems. Data requiring computer analysis is channeled through the Bureau of Statistical Services which provides for data coding and "run sequences" and then routes this to the Division of Data Processing which houses and operates its own equipment. The complexity of modern vocational education problems which deal with the labor market economy and changes, with all elements of human behavior, with social structures as well as problems of learning, vocational subject content and educational facilities structure for all persons of all ages, makes a quality one-man operation in vocational education a difficult task.

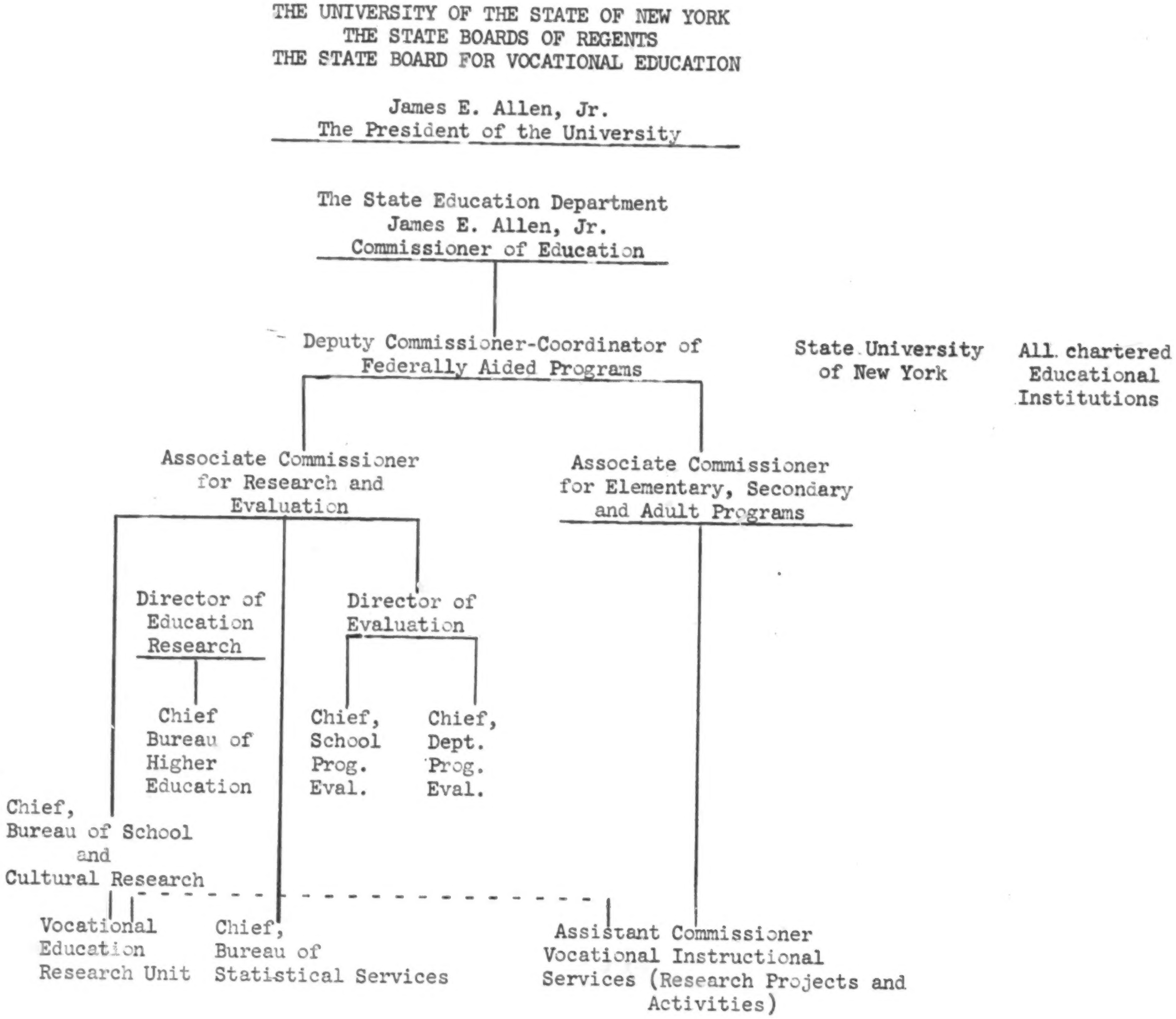
Within the framework just described, activities of the Vocational Education Research Associate have been those of short-term project data gathering and analysis, of consultation in research project design, execution and dissemination with the operating bureaus such as Home Economics, Agriculture, Trade and Technical education, with coordinating of contract research projects for these Bureaus with agencies outside the Education Department, and more recently, as a coordinator and resource person to those public and private educational agencies developing project proposals for funding under Sections [illegible]) and 4(c) of the Federal Vocational Education Act of 1963.

Under the present limited vocational education research program a compilation of total functions and activities would include the headings below. The Associate in Vocational Education Research under general supervision conducts research and does evaluation in the area of occupational education.

1. Assumes complete responsibility for conducting of research projects for a broad range of types of studies, including the identification of training needs of youth and adults, measuring the effectiveness of occupational information materials and programs, evaluating programs and methods of preparing youth and adults for entry or upgrading in occupations, conducting population and program studies in determining education needs, program characteristics, financing, and administration of area vocational schools, and for studies and evaluations of professional services, including administration, supervision, teacher education, instruction, etc., in occupational education.

   Submits advisory opinions after careful study if research projects shall be conducted within the Bureau of School and Cultural Research, the Education Department, or contracted out to local school systems, colleges, and universities, or private research institutions.

   With regard to projects conducted within the Bureau, he prepares outlines of the research, discusses outlines with appropriate consultative personnel, prepares instruments to be used (e.g., data gathering and tests), plans procedures for data tabulation and analysis of results, supervises necessary clerical work, and writes reports.


THE UNIVERSITY OF THE STATE OF NEW YORK
THE STATE BOARDS OF REGENTS
THE STATE BOARD FOR VOCATIONAL EDUCATION
James E. Allen, Jr.
The President of the University
The State Education Department
James E. Allen, Jr.
Commissioner of Education
Deputy Commissioner-Coordinator of Federally Aided Programs
State University of New York
All chartered Educational Institutions
Associate Commissioner for Research and Evaluation
Associate Commissioner for Elementary, Secondary and Adult Programs
Director of Education Research
Director of Evaluation
Chief Bureau of Higher Education
Chief, School Prog. Eval.
Chief, Dept. Prog. Eval.
Chief, Bureau of School and Cultural Research
Vocational Education Research Unit
Chief, Bureau of Statistical Services
Assistant Commissioner Vocational Instructional Services (Research Projects and Activities)

OFFICE OF RESEARCH AND EVALUATION

Present Staff

ASSOCIATE COMMISSIONER

Division of Research	Division of Evaluation	Bureau of Statistical Services
1 Director	1 Director	1 Chief
2 Bureau Chiefs	2 Bureau Chiefs	1 Associate Statistician
5 Associates	2 Associates	2 Senior Statisticians
1 Assistant	1 Associate Statistician	2 Statisticians
3 Aides	1 Assistant	12 Statistical Clerks
Secretaries and File Clerks	3 Aides	Secretaries and File Clerks
Consultant and Consultant Aides	Secretaries and File Clerks	

Division of Electronic Data Processing

Division of Educational Finance Research (under Finance)

All grades at associate or above require earned doctorate and demonstrated research competency. (N=19)

2. He provides consultative field services to local educational agencies in the development of local occupational education research programs, and projects to be federally funded. He assists them in assembling and analyzing data and in the interpretation of their findings.

   Assists local school systems in identifying and conducting special demonstration, experimental, and pilot programs designed to meet the special needs of the groups of persons mentioned in Federal supportive legislation for occupational education.

3. Prepares materials for the dissemination of the results of research and experimental programs through summaries of research findings by reporting to professional meetings, communication with other members of the Education Department, and through articles in professional journals.

Representation on the Interdepartmental Manpower Research Committee makes the resources of the State Departments of Labor, Commerce, Agriculture, Youth, Welfare and the like, available to the Education Department.

The success of this operation and operating arrangement in Vocational Education Research pointed up the unmet need in research, in proportion to the mammoth vocational education present and projected operating program in New York as much as it yielded research results. Accordingly, a second research position on the associate level has been authorized but is as yet unfilled. Please note the recruiting announcement on the last page. If anyone is interested personally or have any doctoral candidates getting through either this June or this summer, please contact me before Thursday afternoon.

However, we feel that this structure is spread too thin to do the job which needs to be done in New York State. Accordingly, we have submitted a proposal, as several other states have, for funding of an expanded research unit to be known as the Bureau of Research and Evaluation in Occupational Education which would continue to operate under the Associate Commissioner for Research and Evaluation in the relationship previously described.

While it is too premature to discuss any big plans for this since the proposal is awaiting USOE panel review, I thought I might mention some ideas as to the expanded role of such an operation, so that it might assist some states in crystallizing their thinking.

One of the advantages of a Bureau operation would give us more opportunity to encourage the submission of small research, experimental, or pilot programs from school systems and provide for funding under section 4(a) Ancillary Services with much less red tape. We feel that one of our top priority needs in the state is to get more vocational education teachers and administrators interested in conducting and utilizing research.

In addition, a Bureau would concentrate in the following activities in addition to doing more of those things we mentioned previously:

1. Evaluation in Occupational Education, would be to identify and corrdinate research opportunities and projects by all educational agencies, public and private concerned with occupational education in New York State. It would do this by:
    a. Scheduling periodic state-wide conferences; similar to those already held, to identify high priority research problems and suggest institutional and procedural arrangements in carrying them out;

    b. Establishing a "data bank" on occupational education statistics and previous research studies which would be available to all public and private educational agencies contemplating research or evaluation projects;

    c. Establishing a system of mutual reporting of on-going or planned research, pilot training and other type projects in the State;

2. Scheduling periodic meetings with other large states planning occupational education research units, to exchange information and give assistance in program development.

3. Identification of the components contributing to quality in area of Secondary and Community College Occupational Education Programs and the development of program quality measurement scales and practices for use by local educators.

4. The promotion of the application of research techniques and utilization results of previously conducted studies in occupational education by local educators in problem areas. This would be conducted by means of lectures, seminars, conferences, and workshops in cooperation with such institutes as Cornell University.

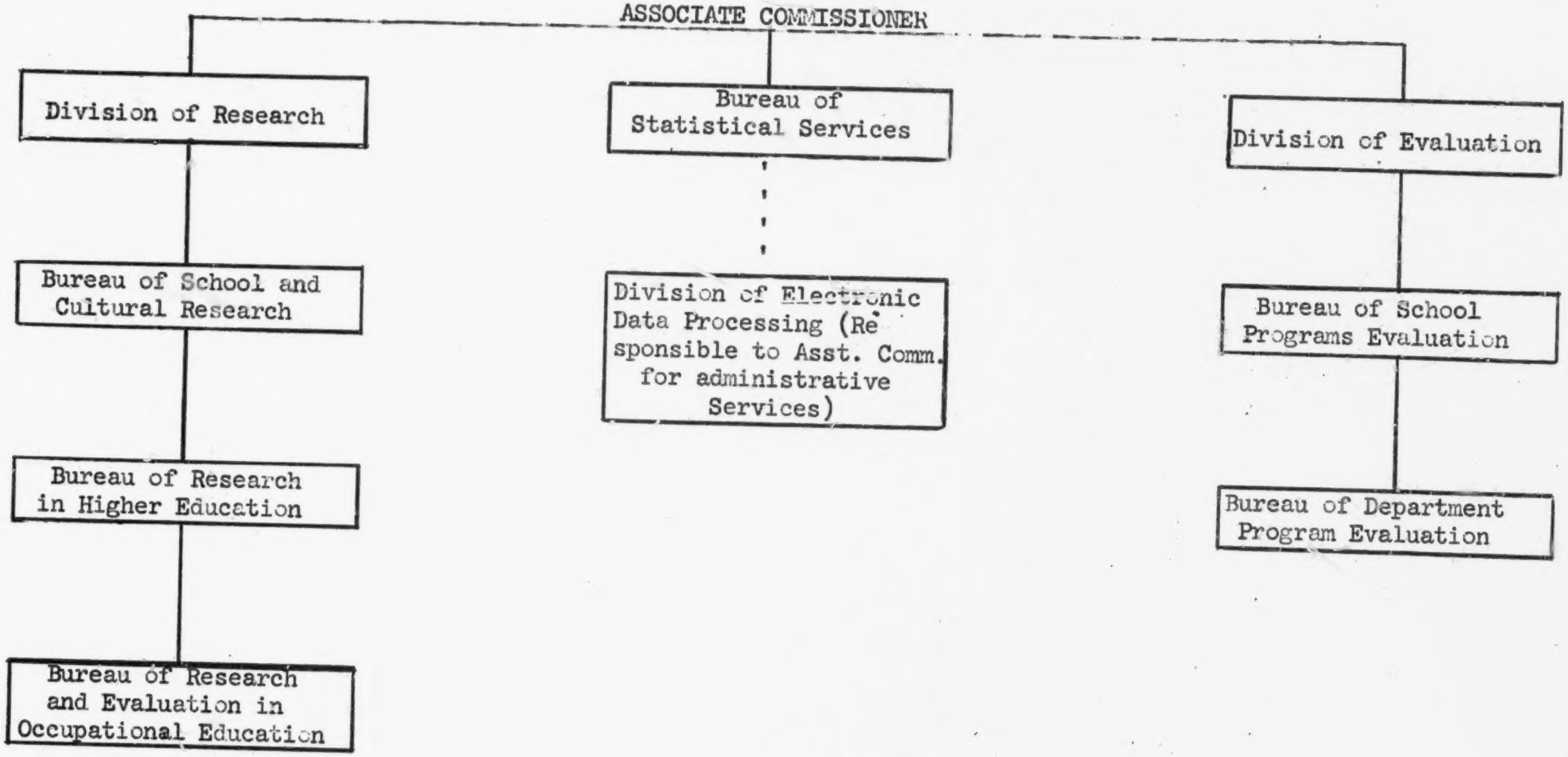
5. Identification of new methods, materials, and organizations for instruction in occupational education, through analysis and study of the most successful Manpower Development and Training Programs, and other non-traditional programs, and dissemination of this information to other educators in New York and other states.

6. The establishment of regular instruments of reporting to those concerned with the guidance and counseling of occupationally-bound youth and adults, the results of such researches and evaluations which might have bearing on the labor market, the necessary skills and attitudes needed by the student, and the educational opportunities needed to bring the two together.

Organization and Location

OFFICE OF RESEARCH AND EVALUATION

Proposed Staff


ASSOCIATE COMMISSIONER
Division of Research
Bureau of School and Cultural Research
Bureau of Research in Higher Education
Bureau of Research and Evaluation in Occupational Education
Bureau of Statistical Services
Division of Electronic Data Processing (Responsible to Asst. Comm. for administrative Services)
Division of Evaluation
Bureau of School Programs Evaluation
Bureau of Department Program Evaluation

This would be in cooperation with the Vocational Unit in the Bureau of Guidance.

7. The identification and demonstration through cooperating agencies, of new approaches to trade, technical and other vocational teacher training and certification.
    a. Providing readily available consultant services in project planning design, and evaluation to all educational and related agencies.
    b. Setting up a "one man" coordinating contact for all areas of occupational education research with each major higher education institution or research-oriented school system in the state.

Personnel

The proposed Bureau of Research and Evaluation in Occupational Education would be staffed during the first year as follows:

* Chief of the Bureau (1)
Associates in Research (2)
* Assistant in Research (1)
* Research Aide or Trainee (1)
Stenographer (1)
* Typists (2)

During the second year of Bureau Operation, it is planned that additional staff be added to the above as follows:

* Associate in Research (1)
* Research Aide or Trainee (1)
* Senior Stenographer (1)

The type of professional staff we would look for and the New York State Civil Service grades and salaries may be of help to other states as they plan their own staffs.

Qualifications by Grade and title:

Specifications and salary are in accordance with New York State Civil Service classification:

1. Chief of the Bureau G-28

    Salary - $13,170 to $15,625 in five annual increments

    Qualifications - One year of full time in Education Research or one year of permanent service as an Associate in Education Research in the New York State Education Department. Experience in vocational education or its supportive services preferred.

2. Associates in Education Research (3) G-24

Salary - $11,482 to $12,745 in three annual increments

Qualifications - Completion of the requirements for an earned doctoral degree including 12 graduate or undergraduate semester hours in education other than practice teaching and 12 hours in research methods and four years of experience in education or in research or in an equivalent combination. Ability to plan and conduct research must be demonstrated, as evidenced by the authorship of a doctoral thesis or equivalent research reports.

3. Assistants in Education Research G-20

Salary - $8,600 to $10,385 in five annual increments

Qualifications - One year of permanent service as Education Aide; or Master's degree and specialization in education including eight graduate or undergraduate semester hours in research methods such as education research, statistics, tests and measurements, historical research or sociological research and two years of experience in education or research and one year of education or of graduate study in education or research.

4. Education Aides G-14

Salary - $6,180 to $7,535

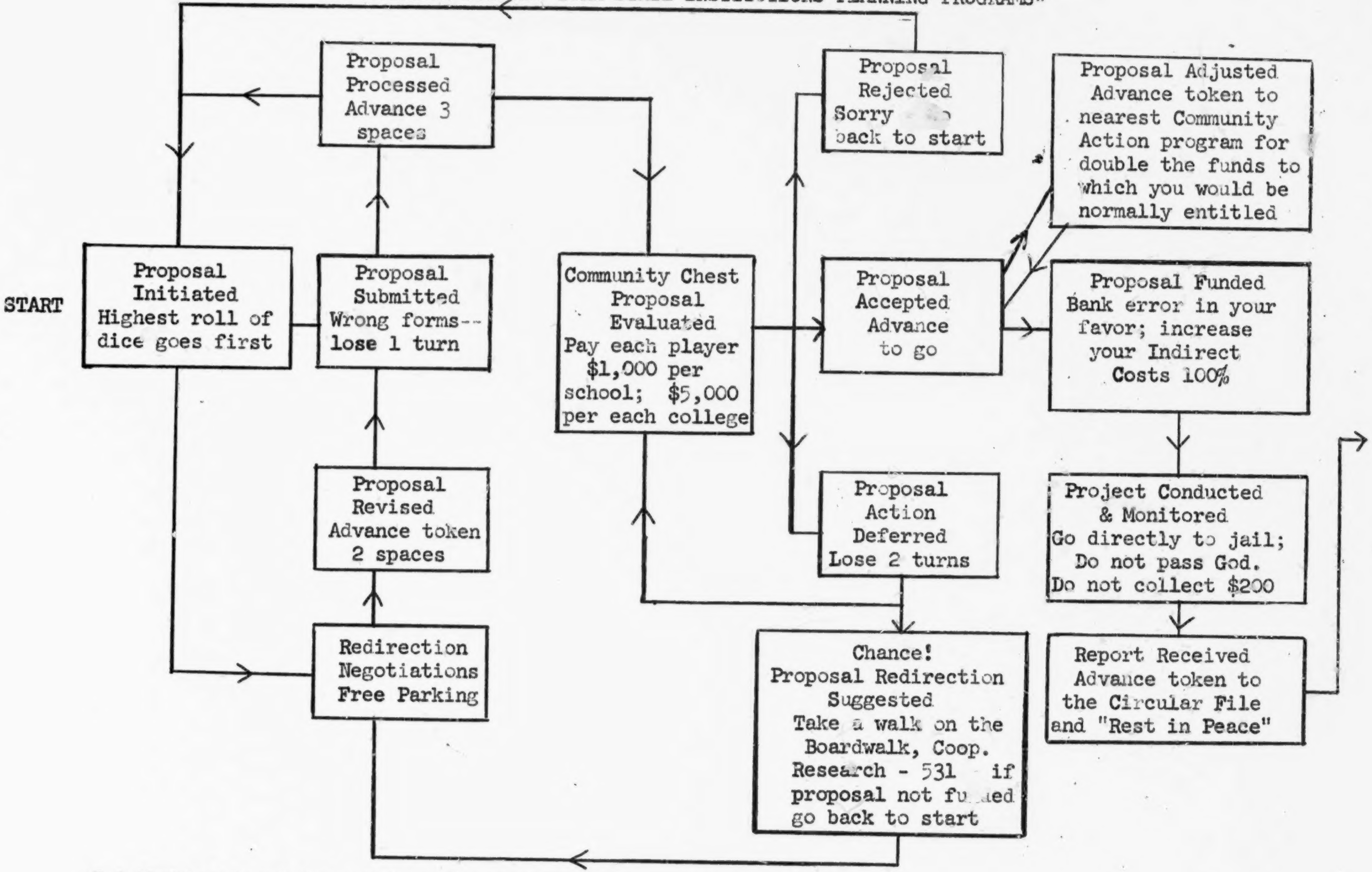
Qualifications - One year of permanent service as Education Trainee or a Master's degree with 12 hours in education exclusive of practice teaching.

5. Education Trainee G-13

Salary - $5,835 to $7,130

Qualifications - Appointments are made from the Professional Career Test by certification of candidates having a bachelor's degree with 12 credit hours in education excluding practice teaching. No work experience is required. After a one-year training program, successful incumbents are advanced directly to the Education Aide level without further examination.

FEDERAL OCCUPATIONAL RESEARCH AND PLANNING PROGRAM (4)c
PROPOSAL PROCESSING SYSTEM
INFORMATION FOR NEW YORK STATE INSTITUTIONS PLANNING PROGRAMS*


START
Proposal Initiated Highest roll of dice goes first
Proposal Submitted Wrong forms--lose 1 turn
Proposal Processed Advance 3 spaces
Proposal Revised Advance token 2 spaces
Redirection Negotiations Free Parking
Community Chest Proposal Evaluated Pay each player $1,000 per school; $5,000 per each college
Proposal Rejected Sorry back to start
Proposal Accepted Advance to go
Proposal Action Deferred Lose 2 turns
Chance! Proposal Redirection Suggested Take a walk on the Boardwalk, Coop. Research - 531 if proposal not funded go back to start
Proposal Adjusted Advance token to nearest Community Action program for double the funds to which you would be normally entitled
Proposal Funded Bank error in your favor; increase your Indirect Costs 100%
Project Conducted & Monitored Go directly to jail; Do not pass God. Do not collect $200
Report Received Advance token to the Circular File and "Rest in Peace"

* A Working Knowledge of Monopoly, Parker Bros. would be helpful.

ADMINISTRATIVE CONCERNS IN ASSESSING DEVELOPMENT AND DEMONSTRATION PROJECTS

by

David L. Clark
Associate Dean
College of Education
The Ohio State University

"Development of Proposals"

I. Statement of the Problem

   A. Establishing the existence of a situation (e.g., an anomaly, a series of contradictory "facts," unverified findings, or an uncharted area) which defines the problem.

   B. Relating the problem to its general, scientific, and social antecedents.

   C. Justifying the utility, significance, or interest inherent in the investigation of the problem.

II. Objectives

   A. Stating the definite goals or ends which will be sought as a result of conducting the research.

   B. Justifying the selection of the specific objectives to be sought by identifying the criteria employed in making the choice.

III. Logical Structure or Theoretical Framework

   A. Expounding the structure or framework within which the situation will be investigated.

   B. Validating the application of the particular logical structure or theoretical framework proposed.

IV. Hypotheses or Questions

   A. Proposing the specific questions which will be answered or the hypotheses which will be tested in the study.

   B. Validating and Justifying the questions or hypotheses chosen for study.

V. Related Research

   A. Describing the studies, programs, and writings which undergird the substantive and methodological aspects of the investigation.

B. Criticizing the identified materials in terms of their strengths and weaknesses.

C. Relating the identified materials to the current project.

VI. Procedural Plan

A. Outlining the overall structure within which the research will be conducted including the variables which will be considered, the conditions which will be controlled, the processes by which the data will be gathered, the sample, and the sources of data.

B. Detailing the design of the analytic procedures and the sample sufficiently to indicate that (a) the hypotheses are tested or the questions are answered unambiguously--the condition of internal validity; and (b) the findings are generalizable to the population or circumstance required by the hypotheses or questions being considered--the condition of external validity.

C. Operationalizing the variables or conditions in the investigation by specifying the instrumentation or the techniques of instrument development including the rationale supporting their selection or development.

VII. Work Schedule and Resources

A. Describing the time schedule of the project, the human and technical resources required, the physical arrangements which have been or will be made to carry on the work, and the fiscal requirements of the study.

B. Justifying the adequacy of the described personnel and facilities to carry out the study, the budget requests, and the rationale underlying any special conditions or arrangements which are necessary.

VIII. General Characteristics of the Proposal (Gamesmanship)

A. Internal logic and consistency.

B. Balance between necessary detail and reasonable length.

C. Adequacy of communication, e.g., legibility, readability, clarity, etc.

D. Force of presentation.

E. Appropriateness to designated grantor.

F. Evaluation procedure followed by grantor.

PROCEDURES AND TECHNIQUES FOR THE ADMINISTRATION OF RESEARCH

by
Orville G. Bentley
Dean, College of Agriculture
South Dakota State University
and
Director, South Dakota Agricultural Experiment Station

There are few hard and fast rules to suggest as guidelines for the administration of research; however, these observations may be helpful to you as you look forward to developing your research program in the field of vocational education.

First I would suggest that a successful research program depends less on its organizational structure than on the technical competence and dedication of a research staff. Nonetheless the organization and the philosophy of the administration toward research is of utmost importance to the morale and the effectiveness of an otherwise qualified staff. People do research. It is best done by people whose personality represents a rare blend of technical competence and dedication to scholarly pursuits well spiced with patience, optimism, and confidence. Similarly, the research administrator also has to have these same characteristics. In addition, his attitudes must be structured around a latticework that includes such items as project outlines, budgets, and other factors necessary to establish and maintain a cohesive program. The research administrator must have the vision and ability to encourage his staff to develop both a long-time and short-time approaches to research problems as a stratagem for building an overall program. A sound program must provide an opportunity for the research worker to follow ideas to fruition. Research is not usually accomplished by an inquisitive mind flitting from idea to idea; on the other hand, a too rigid structural framework for developing a research program is not good. As is frequently the case, the real answer as to the best structure for the research organization lies somewhere between the two.

The administrative framework of a research organization can be flexible thus permitting an arrangement that best fits the research mission and the resources available for achieving its goals. To accomplish the research objective a prosaic rule is paramount; a clear understanding of research goals and working arrangements, both within the unit and the units' relationships to the overall organization, is needed. Once the administrator has these relationships established, he can bring together a staff and proceed with program development.

It might be helpful at this point to comment on experiences gained through contact with research programs and their administration in agricultural experiment stations.

The research program of an agricultural experiment station is a part of the total research effort of the university. The experiment stations are supported by state appropriated monies and federal grant funds authorized under the Hatch Act. These funds are supplemented by monies from other granting agencies such as Health, Education and Welfare--especially the National Institutes of Health;

the National Science Foundation; Office of Naval Research; Department of Defense; and agencies of the U. S. Department of Interior. In addition, most experiment stations receive substantial amounts in private grants and contracts in support of various projects in the biological and natural sciences, and in studies that might be classified as being in the social sciences.

The research mission of the experiment stations is broad in scope and clearly encompasses research in social, economic, and educational problems of young people--particularly rural youth. In the development of the research programs of the experiment station, the interdisciplinary approach is the modus operandi. For example, if an experiment station were developing a research program in the field of vocational education, I would anticipate that the director would hope to mobilize a team of scientists including part or all of these disciplines: sociology, education, economics, psychology, home economics, political science, vocational agriculture, resource development, technicians and statisticians. In most experiment stations, scientists from many of these disciplines are now involved in research programs.

Another important facet of an experiment station program is "to know your territory," as the phrase goes in a popular musical comedy. Since experiment stations are concerned with agriculture and rural life, the staff knows and attempts to understand rural problems--farming, ranching, and social and economic problems associated therewith. The traditional contacts and established lines of communication with rural people, their organizations in the agribusiness complex serving rural America have been utilized as valuable tools to aid the research worker and agricultural experiment station to obtain research data on numerous educational problems. Conversely, these same channels are used to disseminate knowledge gained through research.

The experiment stations have been fortunate throughout most of their existence to have had an educational counterpart in the state university and land-grant college--the cooperative extension services. Not only has the cooperative extension service been the avenue for the dissemination of information, but it provides a mechanism for a "feed back" device from both the rural and urban sectors of our economy and population.

One can speak in generalities about methods of carrying out research and methods for its administration. It might be helpful to this group as it looks forward to developing a research program in vocational education to go through some of the steps considered in developing a "typical" research project in an agricultural experiment station.

1. The first and perhaps as important an aspect as any in the development of a research program is arriving at a philosophical base of understanding toward research. Many people regard research as an accumulation of facts and figures to meet some operational need whereas research should be designed to accumulate new knowledge about a given problem or within a given scientific discipline. The research worker who has a genuine desire to initiate a research program should be encouraged to discuss it with his scientific colleagues and departmental

chairman. Ultimately, it is essential that the experiment station director know about the research interest of the individual, either directly or through administrative channels. Frequently the most direct route will be through the department head.

Most directors aren't concerned whether the staff member or the department is within the Department of Agriculture; a director should be more concerned about the quality of ideas and the research competence of persons wanting to do research, than in the organizational structure. Organization is important,but it should not preclude the initiation of good research.

2. The next step is the identification of the problem. To do this requires consideration of some or all of these factors:

   a. Competent staff with time allocated for research.

   b. Departmental and inter-departmental research committees.

   c. State-wide and national level advisory committees.

   d. A clear-cut understanding of the critical questions facing people and the vision and imagination to apply research techniques to assemble meaningful data or to evaluate hypotheses and alternative procedures or programs.

3. Research planning requires communication of ideas and the delineation of resources needed to accomplish the research. The conventional administrative instrument to accomplish this requirement is the research project outline. These elements should be in a good project proposal:

   Title
   Objectives
   Reasons for undertaking research
   Procedure
   Budget
   Personnel and location
   Duration
   Approval

   Stress the statement of objectives and the elaboration of procedures. A good research outline is one that spells out:

   a. A program of research and its broad, long-time objectives.

   b. A specific outline for accomplishing a segment of this research (usually called the "Research Project"). The project may be designed to cover from two to five years.

4. The evaluation of research results usually involves these elements:

    a. Orderly accomplishment of objectives.

    b. A clearer understanding of the problem or phenomenon under study.

    c. Difficulty in knowing the potential value of research and when it will "pay off."

    d. Publications.

    e. Contribution to knowledge. (Surveys give transitory information frequently, but research on more basic concepts provides a basis for generalizations beyond the scope of the population sample studies, or a physical or natural phenomena investigated).

5. Problems that creep into the administration of research programs.

    a. Failure of departments and individuals to develop a long-term research plan and goals. Planning should be looked upon as a "think device" to answer the question, "How will I use my brains, technical help, research funds to solve problems and expand knowledge within my scientific or professional discipline?" A corollary question should be, "How can I best organize and direct my talents and resources to obtain meaningful results of potential benefit to people, my state, or region?"

    b. The tendency to stray away from the basic research objective by following interesting or tangential lines of research interest.

    c. The pressure to deal with applied aspects and neglect basic research; the latter usually demands more knowledge and imagination from the investigator. John Dewey stated, "Theory is, in the end, the most practical of all things."

    d. Too many projects leading to inadequate financial support, insufficient personnel, and diluted research leadership. Use as a guide professional man years for each category of personnel; project leaders, technical assistants, graduate students; a worthwhile project usually requires a minimum of 0.5 professional man year (p.m.y.), 0.5 m.y. technical assistants, and 1 or 2 graduate assistants. A project involving 1 p.m.y. requires about $20,000 for personnel alone, and a total of from $25,000 to $35,000 of funds to provide for technical assistance, supplies and travel.

e. Failure to complete and publish results.

6. The use of lay advisory committees to advise on research needs and to aid in the evaluation of research is currently popular. This device is useful, but each group needs to know its mission (advisory), and the research leader must assume the responsibility to (a) use a committee once it is formed, and (b) to bring understandable and pertinent questions before the group. Advice from a committee needs to be evaluated and, ultimately, the committee will want to know what happened to its suggestion.

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PROCEDURES AND TECHNIQUES FOR THE ADMINISTRATION OF RESEARCH

by
Calvin J. Cotrell
Assistant Director for Vocational Education
American Institute for Research
Pittsburgh, Pennsylvania

As a member of this panel, I represent private non-profit research in the behavorial sciences. I am employed by the American Institutes for Research of Pittsburgh, Pennsylvania, which was founded in 1946 by Dr. John C. Flanagan, who has served as its president. The firm currently consists of approximately 235 regular full-time employees.

As indicated by its title, the organization is divided into several institutes and programs. Some of these are:

International Research Institute

Institute for Performance Technology

Institute for Research in Education

Military Assistance Institute

Cross-Cultural Research Program

Measurement and Evaluation Program

Among its many and diverse research activities, A.I.R. is currently engaged in several vocational research projects which are being sponsored by the Ford Foundation, Vocational-Technical Division of the U. S. Office of Education, and the Office of Manpower, Automation and Training of the U. S. Department of Labor.

Is vocational research needed? There is an imperative need for research in vocational education. Successful business and industry have for years depended upon research as the foundation for the development of saleable products. Millions have been spent for this kind of research, but what have we done in Vocational Education? There has been very little research in this area. Then what have we used as the basis for the development of successful products in our schools? We have been accused of relying upon armchair logic when other support was needed to establish sound programs. As an example of effort in one phase of vocational education research, however, there have been some one-year follow-up studies of vocational school graduates. This is helpful but it, nevertheless, falls short of being a continuous follow-up to develop data on employment factors other than placement. It is essential to have some evidence on job progression, job security, and other factors of employment performance which have to be measured over a longer time span.

How do we get the right people to recognize all of the vocational research needs? For one thing we may have some state directors of vocational education who do not appreciate the need for research. It seems they are going to have to undergo some "arm twisting."

The utilization of advisory committees by those responsible for research may be an effective approach to convincing the proper authorities of the need for vocational education research. I would see both general and specific area advisory committees utilized. By a general advisory committee I mean one consisting of representatives of all the vocational services or functions of vocational education. These would be vocational agriculture, distributive education, home economics, trade and industrial education, vocational guidance, post-secondary vocational-technical education, and others less traditional in nature. Specific area advisory committees could be organized in any of the areas mentioned. A representative of each of the specific area committees may serve on the general advisory committee.

How do you evaluate research? Assuming that the final report is sound in terms of content, including proper and accurate statistical treatment and good writing, there would be at least three major concerns:

1. The project must have been completed in accordance with the requirements of the contract.

2. Something new should have been learned while completing the research which is beyond the requirements of the contract. (A new technique developed or a new approach tested.)

3. The project should be recognized by appropriate audiences as making a contribution.

How do you obtain staff? Provide an atmosphere conducive to research which allows sufficient freedom but adequate supervision and advisement. Comfortable facilities will help, but more important would be the encouragement and the practice of good human relations.

Employee benefits, such as paying for moving expense, non-contributory retirement plans, life insurance, hospital-medical insurance, and other benefits will help in attracting staff.

Perhaps the most valuable feature facilitating employment of staff would be the provision for flexibility in salary schedules enabling the administration to attract and employ competent researchers.

Provision for employing consultants should be provided in all contracts in order to provide for specialized staff needs and to provide part-time staff in the event of difficulty in locating permanent staff.

There should be provision in the research organization for various kinds of supporting staff. The lack of secretarial, graphic arts, and other supporting staff essential to research activity has been known to discourage prospective candidates from accepting positions offered by some research organizations.

PROCEDURES AND TECHNIQUES FOR THE ADMINISTRATION OF RESEARCH

by

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It is, of course, a difficult matter to summarize one's contribution to what was essentially a conversation between five people. I would like to pull together the major points that I tried to make with regard to what I believe were the five major problems or questions addressed by the panel.

1. How do you present the "story" of your research agency to its public, particularly its sponsors?

Every research agency has a variety of publics with different interests to serve and with different perspectives within which they view the work of the organization. For my agency I can distinguish at least three such publics: the political community, the research community, and the practitioner community. Each requires different kinds of "data."

The political community is not much concerned with the substance of what we do as with the number of persons we reach in some way and with whether those persons we do touch have a generally favorable impression of our work. Thus, it is a political datum to be able to say that we worked in 43 of the 88 Ohio counties last year, or that we received 276 letters of praise from persons who attended our regional custodians' workshops.

The research community is concerned with whether or not our work meets minimal standards of scientific rigor and whether or not the results of our research make a contribution to knowledge. Our list of publications, a description of the areas within which we are working, and statistical tables of our findings are data of interest to the research community.

The practitioner community is concerned with applications we can make of our research to their problems, or the consultant help that we can render to them as they seek to develop solutions to their action problems. The nature of our services, the ease with which they can be obtained, and the practicality of our recommendations are typical data of interest to the practitioner community.

Obviously all three communities are crucial to us. We need their understanding and support and we need to give them an opportunity to influence our work through their suggestions and criticisms. Channels of communication, as through advisory boards, must be kept open. We must also remember, however, that each represents a quite different interest, and that these interests may at times be in conflict.

2. How does the research administrator relate to his personnel?

Like all administrators, the research administrator must constantly tread a thin line between telling the researcher what to do (an institutional program) and supporting the researcher in what he wants to do (an individual program). Where we know what we don't know, we can set up a program to find out, and under such circumstances an organizational program makes sense. When we don't know what we don't know, we must largely rely on the researcher's own instincts to guide us (the "green thumb" researcher, as one participant suggested). In the latter case we must be especially careful to provide extant psychological support, for there is nothing more anxiety-producing than to be on a road whose direction is unknown, and whose end may be useless of attainment. The research administrator must know when to allow the researcher to push on and when to call a halt. I don't know of any good operational indication that tells one when to select each option; however, the research administrator who doesn't have a good "sixth sense" in this area won't remain an administrator long.

3. How is a research program evolved?

In every area, as I have already implied, there are things we know that we don't know, and other things we don't know that we don't know. A program must have flexibility to permit movement in both these arenas. In the former case, it is convenient to sketch a kind of "cognitive map" that will soon pinpoint the areas in which our knowledge is impoverished, and we can push ahead in a programmatic way to resolve these. In the latter case we must rely on our insights, on our feelings of unease or disquiet, and even on serendipities to push on.

4. How does the research administrator evaluate the work of his agency?

There are a number of very operational criteria that all of us apply: do we stay within the limits of our budgets; do we stay out of trouble with the auditors; is our work accepted for publication, and if so, are reprints requested; can we get follow-up grants; and the like. Insofar as the work fits into a program, we can ask whether closure has been obtained, whether a "no-knowledge" area on our conceptual map has been closed out, and whether the research is heuristic, i.e., whether it opens as many new questions as it answers.

One criterion which many people wish to apply is whether the research leads to any practical application. This is a criterion which I resist stoutly, unless it is the avowed intention of the project being evaluated to produce such an application. Generally, the researcher's function is to produce knowledge; and while I may hope that that knowledge might sometime be applied, I believe it is a subversion of the researcher's time and talent to require him to achieve those applications.

If applications are desired, a special development and diffusion unit should be established to be responsible for them. We have been particularly lax in education in setting up such mechanisms intermediate to research and practice, apparently on the assumption that applications occur automatically once knowledge is given and an alert practitioner is properly motivated to improve his lot. Agriculture has known for almost a century that this is not enough--the Agricultural Extension Service is a splendid example of such an intermediate agency. We need a similar mechanism in education.

5. Is proposal writing necessary and desirable?

That proposal writing is necessary is clear from the fact that it is on the basis of proposals that grants are given. It is often argued that it is not a desirable activity, however. A colleague of mine recently estimated that fully a third of his time was given either to writing proposals or to evaluating proposals written by others. What a waste, he implied!

I do not agree with this position. My own experience in reading and evaluating proposals leads me to believe that researchers are troubled by a considerable amount of muddy thinking. I am sure that only thirty to forty per cent of the proposals that I read have even a reasonable problem defined, and many of these subsequently fall down because their objectives or procedures are not matched to the problem.

I believe that proposal writing, when viewed not as a chance to get money but as an opportunity to order one's mind about the research to be done, can be of great benefit. The discipline it imposes on the mind is more than repaid by the greater effectiveness and efficiency of the subsequent research activity. I strongly urge that we continue to insist on well-disciplined project proposals, even if we devise other ways of funding, because of the great positive effect on the researcher's mind.

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PROCEDURES AND TECHNIQUES FOR THE ADMINISTRATION OF RESEARCH

by
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I am pleased to be here; I hope that I can be of some assistance to you by bringing to you the outlook of an industrial laboratory. The Circleville laboratory of the DuPont Company includes about one hundred fifty people of whom about forty are technically trained. Our funding, of course, is entirely private; we seek money from no one other than our own management. We spend our money within our own company, that is--we do very little research with other research organizations. Our budget is between three and four million dollars a year, which is directed at providing the scientific and engineering basis for maintaining our position in the field of plastic films, which have a variety of both industrial and packaging uses. Again, as this organization is substantially different from yours, I hope that perhaps I can bring some new points of view to you.

(The question has been asked by Dr. Bender on how personnel responsible for research at DuPont get more money allocated to research.) I think that a key to this, on the part of the director or administrator of research, is to have clear, understandable objectives. Now, I want to emphasize "understandable." These objectives should be understandable, not to the scientific community who will be doing the research, but rather to those people who are responsible for the expenditures and for the results, who will eventually want to see something change, as a result of the research! There is no better way to get a proposal killed than for me to present to my management a dissertation on electron-bonding, or a discussion of pi-electrons. This does not mean anything to the people. The thing that is important for me to do is to talk about earnings which can result from achievement of certain objectives. If I propose to develop a polymer that will stand up at a thousand degrees centigrade and which is needed in jet airplanes, this can be understood as a business objective, but if I launch into a dissertation on how I am going to study high temperature polymers in terms of purely technical activities, I do not sell the objective. So, let me make a real point ... make sure that your audience understands your objectives.

(In that case, who is the audience?) The audience consists of the man to whom you are selling the program. Now, if I am talking to the president of the company, I may talk along one line; I would not use those same presentations to talk to people whose interests are primarily scientific! You have to have clear, understandable objectives in terms of your specific audience. Now, I guess in your case, you are going to be dealing with a heterogeneous group--political people, educational people--I think that you have to tailor-make your presentation.

(Concerning the use of advisory committees which has been under discussion today) let me make just one point. With the use of advisory committees, I think that it is very important for an administrator not to let himself get trapped by the committee, so that he is forced to accept their recommendations. You should use them as advisory committees, dealing with them in such a way that you are not committed to accepting their advice. Otherwise, as an administrator you have lost control of your activities.

(Concerning recruiting staffs and establishing staffing patterns for research programs in industry, keeping in mind the conflicts which arise between research personnel and management personnel, Dr. Burton had this to say.) Certainly, we are trying hard to recruit people, and there is just tremendous competition; I think that this is universal. Actually, there is not a shortage of bodies--there is a shortage of minds, and this is the reason that we all are competing for the top five, ten, and fifteen per cent of the students in any field. But, I want to go back to Egon's point on this conflict between research and management, which is a perpetual subject for discussion. There is a concept which I think is very helpful to research administrators, and that is to recognize the difference between what some people call "functional control," and "operational control" of the people in your organization. By "functional control," you provide objectives. You tell them, "where we should go," "what do we want to do?" Then you say to your researcher: "All right, now get me there! You pick your methods and tools. I will support you as needed, but you must get me to the objective." And, if you tell the man this, and if he accepts that objective, you are in good shape, providing he has the ability to pick the route and to execute the program. Obviously, some checks and controls are needed.

In "operational control," on the other hand, you tell the man: "This is where I want to be, and this is just how I want you to get there." And, brother, you are in trouble, when you do this, when you practice operational control of competent research people. Because, as a matter of fact, it is just barely conceivable that they may have better ideas than you, and they just will not follow your route. Further, they will feel that they are cogs in the organization, instead of being vital, important, creative parts. I think that it is very important, again, for any administrator to say to himself: "Now, what kind of control am I providing--functional or operational?"

(When asked how industry knows it is getting its money's worth in research, Dr. Burton commented that:) In some respects, industry is a little easier. If I can turn to our profit-and-loss sheet, and see that new products developed in our research laboratory are selling and making money, I can say that was money well spent. However, the problem is that it frequently takes so long to get things to a profitable position that you have to get some intermediate measure of effectiveness. The thing that I personally do is to examine my environment and see if things are changing as a result of our work. When I say, "things changing," I mean a variety of things. If new facilities are appearing, this is change, and if it has resulted from our work and since there are enough checks and balances including judgment of other people who had to evaluate the work I judge our research to have been effective.

How are ideas changing? Have people in other organizations changed their points of view; for instance, the sales division, the manufacturing division, the management--sometimes have different points of view with regard to a specific situation. Now, if research unifies a position, so that salesmen or production men change their positions or attitudes, I say, "Great, we have done some good research." So, I think a good measure is positive change in ideas, facilities, profit and loss. If the same people continue to sit around the same old table, talking about the same old ideas, except asking for more money, you do not have very good research.

There are people who are dedicated to maintaining the status quo, who are afraid of the new, and who do not want to learn a new way. If a man is making his living teaching kids how to read Braille, he could see this thing as a personal threat to his security, and so resist the change. Good research must include preparation for the utlization of the research. Frequently, the researcher by himself cannot do this, but it is the responsibility of the research administrator to see that this vital part of the work is done by appropriate people.

(When questioned about what should be the nature of a research proposal, the following comments were made.) Within DuPont Company, research projects are made in one page; if I send off a two-page project, it will come back unsigned and unread as being "too long." This is independent of the project size. I sent off one the other day for $700,000 which actually was less than a page, and it was authorized promptly. I think that the key thing was that I prepared the audience: I stated the business objectives, and I stated the technical objectives which had to be achieved to accomplish the business objectives. The objectives were accepted and since management had confidence that my organization had the scientific competence to do the job, that was it.

(The question was asked, "Even though you said that you sent away one page, you must have had something of more than one page to back it up. In other words, all of the thought that you have given to this, in terms of the planning, does not represent just one page, does it?") Well, all right, this is true, and it gets back, I think to the key that the organization has to have confidence in its parts. As a matter of fact, I perhaps overdramatized this large project. In that case, I had discussed the project, but I think that the audience that I had with the key people lasted no longer than half an hour. Now, to get back to some smaller projects which involve twenty or thirty thousand dollars, I have had those kinds of things authorized and other directors in the DuPont Company can get these things authorized by writing things down specifically and sending them off. I may call the boss and say, "We have had an idea and are sending down a project. Look it over and if you have any questions, call me." Sometimes I get questions, and sometimes I do not.

(In closing, Dr. Burton made the following comments which summed up his concerns as an administrator of research.) One of the problems that an administrator faces is that of wearing many hats, and I think that it is important for an administrator to recognize and be conscious at all times as to which hat he is wearing. For my own thinking, I divide my activities into four areas: First, that of Planning; second, that of Organizing; third, that in Leading; and, fourth, that in Controlling. Now, my relationship to the organization is quite different as I am consciously exercising these different functions. In the Planning session, there may be a great deal of exchange ... I need to be open, receptive to all of the ideas in the organization. At some point, though, there comes a time for decision. In Organizing, again, this is a case where the administrator needs to lay out what needs to be done to accomplish the results. And in this regard, let me say that I recommend very, very highly (the use of) arrow-diagrams or Pert Charts for both Planning and Control. It is also important that after you make them, you review them regularly to see how you are doing and to make appropriate changes. The third function is this one of Leading; this is extremely important. In this regard ... achieving enthusiasm for attainment of the organizational objective is most helpful in getting maximum productivity from researchers. This gets back to the concepts of operational and functional control. Then, there is this fourth function of Controlling--when you are finding out whether the money has been well spent, whether the budget is over or under, and so on.

I have found these concepts to be very useful and recommend them for your consideration.

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THE ANATOMY OF A FUNDED PROPOSAL

by
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The advent of 11.8 million dollars for occupational research and planning makes it crystal clear there are problems needing solution. Today, there are some 1,200,000, about as many as make their living producing automobiles, planes, and ships--working in the invention industry called "Research and Development" (Velie[1], 1965). The research capabilities of education, in contrast, number about 3070 (AERA[2], April, 1964) and education, too, employs about as many persons who make their livelihoods manufacturing automobiles, planes, and ships (NEA[3], February, 1964). In vocational education, Evans (1963) pointed out a little over a year ago that we approximate fewer than one hundred competent researchers. It is no wonder then that we are here today to examine and strengthen our determination to mount a more adequate program of problem solving.

Wanted--Vocational Innovators

Few would disagree that we need more problem solving. But we solve problems every day, so why so much fuss about needing research? The answer is quite simple. Educators as a whole and vocational educators in particular are quite naive when it comes to sophisticated problem solving. Educational researchers communicate in a jargon somewhat unfamiliar to the average vocational educator. For example, a "hunch" is a hypothesis, a "design" is a procedure, and a "variable" may be a number of different things, many of which can't even be accounted for. "Reinforcement" is not something put in concrete to make it stronger, and "control group" is not how well the teacher disciplines a group of students. These and many other terms are going to be found more frequently throughout the professional literature, because educators are becoming research minded.

To imply that vocational educators are not problem solving minded would certainly be incorrect. However, to say they are research sophisticated would also be a mistake. Enough formal research just isn't in evidence in vocational education.

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[1] Velie, Lester, "Wanted - One Million Innovators in Science," The Readers Digest, April, 1965.

[2] American Educational Research Association, Newsletter. Vol. XV, No. 2, April, 1964, p. 1.

[3] National Education Association, "School Statistics, 1963-64." National Education Association Research Bulletin, February, 1964, p. 2.

From the conception of the Cooperative Research Program (Public Law 531) vocational education has had less than a dozen studies approved for grants. Under the 11.8 million dollars in the Vocational Education Act of 1963, proposals submitted by our own people are conspicuous by their absence. Only a handful of formal research staff studies have been going on over the years. Few vocational teacher education institutions even consider releasing staff members part time to do research as is often done in other disciplines. The bulk of vocational education research has been at the graduate student level, and even here the number of studies leaves something to be desired.

Lawrence W. Prakkin[4] (April, 1965) points out in an editorial entitled "To Keep the Faith":

> Changing of habit patterns of long standing is difficult and disconcerting. Problems of curriculum, courses of study, equipment, facilities, and staff are compounded by the new and broader approach vocational education can take with the new resources as its command. Adding these new responsibilities does not mean that the old programs are bad--they just are not enough to do the present-day job. We will have to live with change if we are to meet our obligations and make every effort to adjust to new requirements, new administrative organization and changing responsibilities.

Change in our field is a must, but to know what changes produce what results, and why, are the keys that need to be accounted for through research.

I have been asked to discuss with you the development of a proposal that was funded. This applies success in one way or another. The particular proposal I am drawing my experience from is really not important, but to satisfy the curious it is entitled, "The Preparation of Youth for Effective Occupational Utilization," and was funded by the Cooperative Research Branch for a two-year period at an amount of $201,000. In other words, it is a sizeable undertaking and even now has a number of people involved in carrying it out. The anatomy of this experience is pertinent to those of you here. So from here on I am referring to the process, the stumbling blocks, and the hazards of getting involved in this business of putting together proposals.

The Incubation Period

The incubation period represents the starting point. Frankly the article that appeared in Harper's Magazine by Edward Chase[5] (April, 1963), "Learning To Be Unemployable" annoyed me to the point of wanting to look at vocational education in a more positive light than he did. After all, those of us in the business certainly know where to look to find the dirt, and Chase had pried into some of our darkest corners.

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[4] Prakkin, L. W., "To Keep the Faith," School Shop, April, 1965.

[5] Chase, Edward T., "Learning To Be Unemployable," Harper's Magazine, April, 1964, p. 1.

It so happened this particular article and the study by Mary Kohler[6] (1962) which focused on some of the problems of vocational education in New York City hit print about the same time, thus giving double reinforcement to my desires to study vocational education from a more positive setting.

I casually mentioned the repulsiveness of these two readings to a colleague of mine[7] at lunch one day. The interesting thing, this chap is a labor economist, and it took such a conversation to learn that labor economists are interested in our problems. Anyway, shouldn't they be when you come to think about it (which I submit may be new to you also). Well, immediately we had a point of mutual interest and one that took on dimensions of an interdisciplinary nature.[8] The more we began exploring our joint interests, the more obvious came our individual strengths and weaknesses relative to this whole business of man, education, and work. It should be obvious to you that such a team approach focusing on any problem is pretty hard to beat. This I am sure was one of the strengths of our proposal.

During this incubation period we held many discussions in order to delimit the problem so it could be properly attacked. Naturally, put two heads together and there is never going to be entire agreement, but the team concept will prevail if the overall goal is of mutual interest.

At the same time we were thinking of sources of funds to conduct a sizeable study. Now at this point I pause to remind you that nothing ever prevented the vocational education leadership to use a sizeable amount of state and federal money for research, but this never occurred to us. Just being aware that now there are several sources of funds is mighty important. My colleague had some experience with the Ford Foundation, and we knew they weren't buying anything of this type at the moment. I had recently received a grant from the Cooperative Research Branch, so I knew they were interested in vocational education. It was, therefore, natural that we couched our format in the Cooperative Research style. Incidentally format is important. If we had chosen the Ford Foundation track, our style would have been much more of the essay nature with greater emphasis on the development of the problem and less on the procedure.

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[6] Kohler, Mary Conway, Youth and Work in New York City, New York, New York, Taconic Foundation. 1962.

[7] Kaufman, Jacob J., Professor of Economics, The Pennsylvania State University, University Park, Pennsylvania.

[8] Not that education is a discipline, but rather that educators can work with the disciplines on mutual points of concern.

Few realize the tremendous amount of time involved in preparing or writing a proposal. And let's keep in mind the competition for funds is great, so what is submitted in the way of a few written pages (usually 15 to 20 single space typed) has to be good. Therefore, the dichotomy of the task when more than one person is actually preparing a proposal was our next problem. The "problem statement" was definitely a joint endeavor as were the objectives. The review of literature section was facilitated by each of us having kept a card index on our readings; these being turned over to one individual to develop. The procedure section grew out of our discussions and was written by one of us. This left only the budget and here we looked into a crystal ball for something that seemed logical in terms of the size of the project.

Other aspects which we were **sensitive** about dealt with internal university mechanics. We were in different departments, in fact in different colleges. This proved to be no problem as most college or university administrators are surprising agreeable to having the disciplines work closer together. Moreover, most higher education institutions have a contracts officer who can be of immeasurable assistance in preparing the budget phase of the proposal and can help in expediting it through proper channels. I'm sure it doesn't surprise you to know that colleges and universities are set up for receiving and administering grants much better than most State Departments of Education. I think our friends in the physical sciences have had something to do with this as they have been bringing research money to campuses for quite a few years.

The Prenatal Care

I cannot repeat too often that the writing of proposals takes time and is in itself costly. It is, however, the gamble one takes if seeking outside grant funds. The importance of this step should be obvious to those of you here because we all know to begin any project without a well thought-out and developed plan is tantamount to failure. We in vocational education have been guilty of this whether we'll admit it or not. The pressures often seem so great that we are forced into action before the master plan is developed. We tend to rationalize this by the statement that we are "men of action," but I wonder how much further we would have been advanced if we had taken the time to get the facts to back up some of our actions. Actions which incidentally even now are being challenged. I, for one, respect the awarding of grants on a well thought-out proposal.

The prenatal care of the proposal which I am describing was one of not only writing the several drafts but getting the department chairman to be sympathetic to devoting load time to the activity. Proposal writing on a moonlighting basis cannot be expected if you are really interested in research. It must become part of the job and time for it to be done adequately must be found

The typing of several drafts is a clerical consideration needed to be taken into account and the final duplication and collation with its thirty or so copies represents considerable work load. From my experience, the climate for these details is much greater at the college or university setting than again in State Departments of Education.

A word at this point should be said about timing. One of the early bits of information needed is the cut-off date(s) of the agency to which you are planning to submit. In some cases there may be only one such date per year. The Sears Roebuck Foundation firms up their budget once each year; the Cooperative Research Branch three times a year; and the Vocational Education Act of 1963 is operating on about a three month cut-off. The dates of submission provide a target time in which to get the proposal firmed up. It's far better to skip a cut-off date than to hastily put together the proposal.

Keep in mind whatever you place in the budget will have to be negotiated in contract form, even if the proposal is approved. Therefore, know how you arrived at your budget figures. Then, too, you should be aware that there is such a term as "efficiency of budget." A good proposal can be thrown out because the budget is unreasonable. At the same time an underpriced budget calls attention to the naiveness of the submitter. The overhead rate (usually 20 per cent for U. S. Office of Education funds) is expected to pay for something in the way of a university contribution. The asking for desks, chairs, and typewriters; in other words, routine pieces of office equipment waives a red flag in the eyes of some review panelists. Graduate assistants are a legitimate part of any research undertaking. However, to assume a single proposal is going to buy enough graduate students to put a department in the graduate program business for a long time is also unrealistic.

Moreover, the principal investigator himself should be well aware that it is his talent that is being bought. So, it stands to reason when a budget is examined only to find the principal investigator devoting less than one-fourth time raises serious question in the minds of the reviewers as to who they are buying to do the job.

All-in-all, the prenatal care period of this anatomy is one of hard work, much frustration, and genuine relief when the proposal is packaged up and shipped off. Our project had an interesting turn of events when I decided the pastures were greener over at Rutgers and left Pennsylvania State just prior to the time of submission.

The Delivery

The waiting for a reply can be a frustrating experience. The delivery of this information can take three months or longer. As an experienced father will usually indicate, the first one is the most difficult to sweat out. Premonition is usually worthless at this point.

What usually happens, one needs a little time to relax from the tensions that have been built up during the prenatal period, and it will take at least a few months before psychologically you are ready to try another one. Meanwhile, the experience you have had will have stimulated your thinking along other problems and other research. This is why researchers seem to be such dreamers; walking around with their heads in the clouds hardly speaking to their colleagues.

In due time some response to your submission is received. This may be quite emphatic, especially if you have dealt with one of the private foundations. Yes, we are interested or no we are not. The U. S. Office of Education funding agencies will deliver in a more subtle manner. A stands for approval and all is well. P means provisional approval and some small changes must be made. R indicates you are being encouraged to resubmit, but possible major revisions will be needed. D means disapproval and you might as well look for another problem or try another granting agency. And H is reserved for "hold" as there is something lacking in the proposal or more information is forthcoming. The healthy baby is, of course, an out-and-out approval. But don't get too discouraged if you end up with the need for some minor changes or even are requested to resubmit. These are hopeful signs and the tape kept from the review panel discussions may be most helpful in revision and resubmission. Assistance in this respect comes from the person who is monitoring your proposal.

If a contract is written, have the ammunition to back up your original budget request. A lot can happen between the time the proposal was first submitted and the writing of the contract. Don't hesitate to ask for additional sums (usually small) which you may have overlooked. On the other hand, don't be afraid to reduce your budget request on unrealistic items which the monitor may point out to you. Reach a satisfactory agreement to both parties and by all means if you have any doubt, plan to have the university contract official present.

One last point that should be made quite clear. The usual practice is that the research grant is the right of the researcher and not the institution to which the researcher is attached. This is to say, if the researcher (principal investigator) moves, he has the prerogative of taking the grant with him and the funding agency will usually back him up. He is what they bought in the first place.

In Conclusion

In too short a time I've tried to relate one successful experience to you. For each success there may be a number of failures, but this is part of the "learning by doing" in which we all believe. We have pointed out the long way vocational educators have to go to develop a real research capability; we've tried to indicate an interdisciplinary approach to our problems is looked upon with favor; we've traced some of the steps in proposal preparation, and we've called attention to those of you who will administer the vocational program of research that this is not a moonlighting business--that we must get geared up to the job in terms of competent personnel, time, and financial assistance. The end product though will add a blue chip stock to your holdings which will pay dividends long needed by vocational education.

In closing let me say, we are on the move. We've had some success already and we must keep in mind that it is far more preferable to do a few things well than to do a lot of things in a haphazard manner. Vocational educators must administer their research programs well even to the extent of starting out on a very small scale. For whatever we do must reflect in the quality of our product and not in the mass production of more of the same.

DIFFUSING EDUCATIONAL INNOVATIONS

by
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INTRODUCTION

Education is fast changing and administrators of educational organizations need to alter their styles, methods, and structures to keep in tune with the times. I wish to review certain investigations dealing with change in education, and to point out some of their action implications for you.

Further, to you who are in positions of responsibility dealing with educational research, I'd like to suggest a fruitful topic for needed studies: research on the diffusion of educational innovations.

We spend tremendous resources in education in developing educational innovations and additional thousands in inducing local schools to adopt them, yet I know of only one U. S. educational researcher who is entirely devoted to the scientific study of how these new educational ideas diffuse. We seem surprised that kindergartens required over 50 years to reach widespread adoption by public schools, and similarly are fascinated that language laboratories increased from about zero in 1955 to over 4,000 in 1962, yet we know little about how either innovation was communicated and adopted.

A theme of my paper is that we need to devote increased research attention to investigation of the process by which educational innovations diffuse. Such research investment will pay off, I predict, in speeding the rate of adoption of these ideas; it will also, as bonus, add to our fundamental understanding of human behavior, especially that dealing with communication and change.

Objectives of this paper are to:

1. Point out the evident increasing rate of change in U. S. schools.
2. Trace the major research traditions in past innovation diffusion studies.
3. Speculate about how the nature of the educational institution likely affects applicability of past diffusion research to the case of educational innovations.
4. Describe four types of findings from past studies dealing with (a) the innovation process, (b) adopter categories, (c) the rate of adoption, and (d) opinion leaders.
5. List possible implications for action from educational diffusion research.

RATE OF CHANGE

Figure 1 shows the rate of change for three educational innovations. These data, suggest an increasingly rapid rate of change. This faster rate of educational diffusion may be due (1) to the ethos of the post-Sputnik era, with an increased emphasis upon the importance of education and especially upon certain school subjects, NDEA and foundation support for innovation, etc.; (2) to other concurrent changes from the 1920's to the 1960's like improved travel and mass communication, more professional school staff, etc.; and (3) to differences in the innovations themselves; for example, better "packaging," greater credibility of communication source, differential degrees of upsetting the total school structure, financial cost, etc.

Figure 2 shows how the rate of change in New York state schools increased in the post-Sputnik era. Is there a similar snowballing rate of change in your states' schools?

RESEARCH TRADITIONS ON DIFFUSION

One cannot help but be impressed, after reviewing the same 732 available publications on the diffusion of innovations, with the amazing similarity of findings by each of six major research traditions, which was accomplished in spite of the great lack of awareness by each tradition of the others. One would least expect this occurrence among researchers studying how ideas spread!

The six major traditions are:

1. Anthropology, where typical studies are concerned with how ideas diffuse from one society to another or with the social consequences of technological innovations.

2. Early Sociology, where S-shaped adopter distributions have been found and where some correlates of innovativeness were determined.

3. Rural Sociology, where major research attention has focused upon correlates of farmer innovativeness, how properties of innovations affect their rate of adoption, and upon communication channels at stages in the adoption process.

4. Industrial, where industrial economists and engineers have studied the correlates of innovativeness among industrial firms.

5. Medical Sociology, where investigations were conducted on the diffusion of a new drug among physicians, and on the acceptance of the Salk polio vaccine.

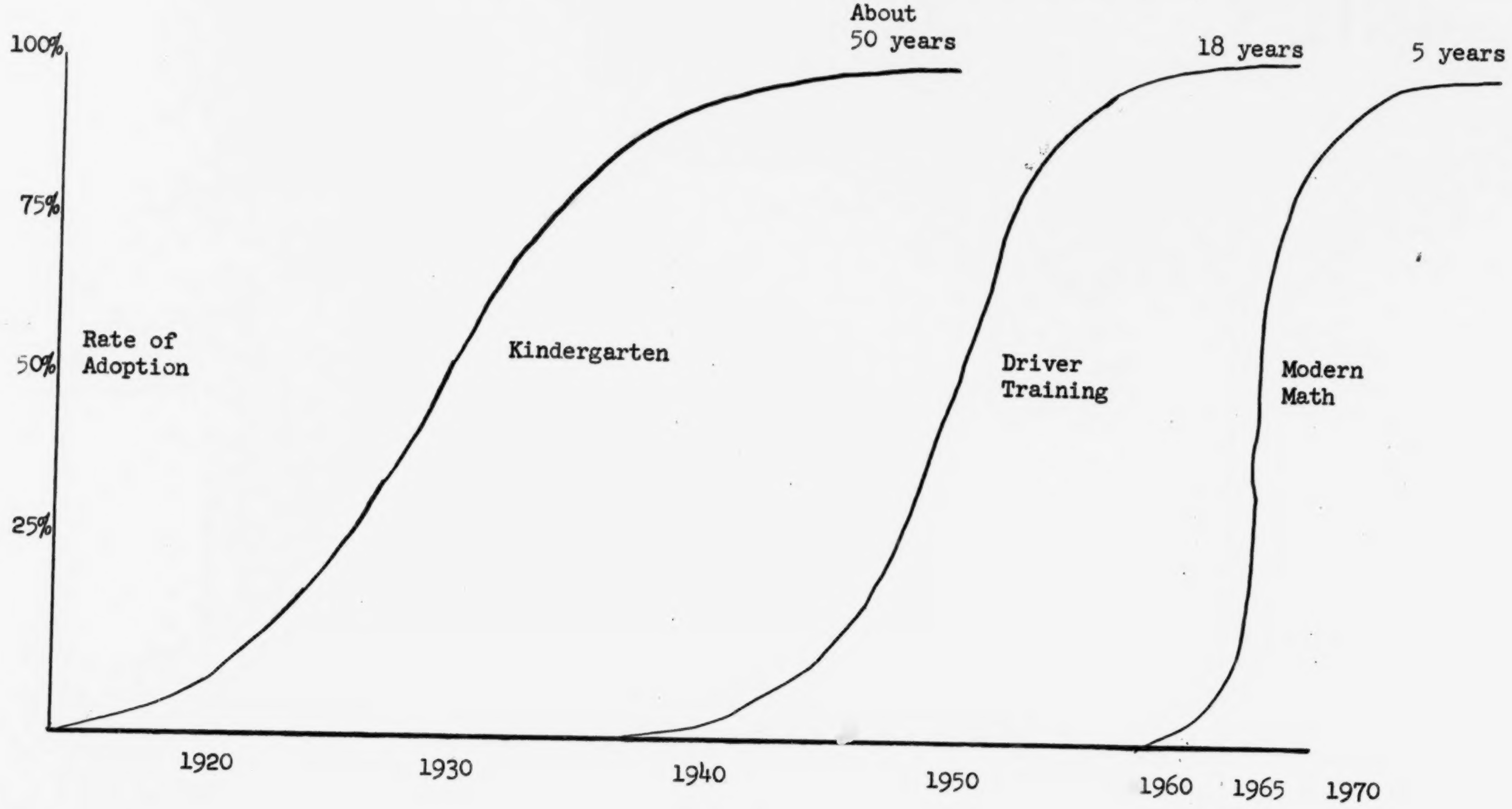

Figure 1. Approximate Rate of Adoption for Kindergartens, Driver Training, and Modern Math in U. S. Schools.

Source:

[1] Mort, Paul R., Principles of School Administration, New York: McGraw-Hill, 1946, pp. 199-200.

[2] Allen, Harley Earl, The Diffusion of Educational Practices in the School Systems of the Metropolitan School Study Council, D. Ed. Thesis, 1956, New York: Teachers College, Columbia University.

[3] Carlson, Richard O., School Superintendents and the Adoption of Modern Math: A Social Structure Profile, in Matthew B. Miles (ed.), Innovation in Education, New York: Bureau of Publications, Teachers College, Columbia University, 1964.

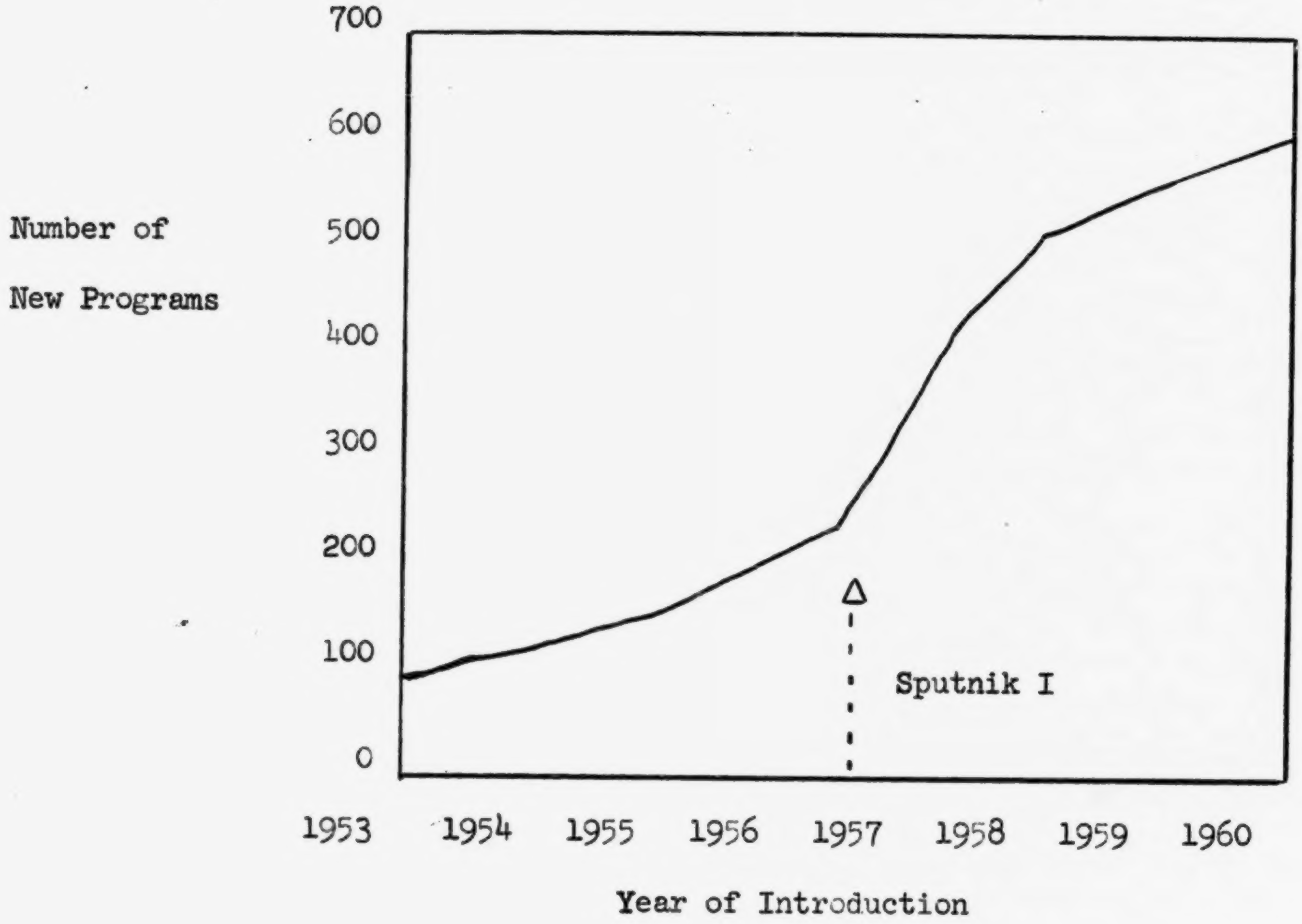

Figure 2. The Rate of Adoption of Educational Innovations Increased After Sputnik in New York Schools.

Source:

[4] Brickell, Henry M., *State Organization for Educational Change: A Case Study and a Proposal*,(1964. p. 495), in Miles *op. cit*.

6. Education, where studies on the correlates of innovativeness among schools were conducted, especially by Paul Mort and his followers at Teachers College, Columbia University. In recent years, however, some educational diffusion research has been completed at Ohio State, Pittsburgh, Oregon, North Carolina, and Michigan State.

THE NATURE OF EDUCATION AS IT AFFECTS DIFFUSION

U. S. education is an inviting bathtub in which to float one's diffusion research boats. But there are certain aspects of the nature of U. S. education that should make us cautious on applying the results of studies in other traditions, such as rural sociology, where the most studies have been conducted.

1. One difference between agriculture and education is that, as Pelley[5] (1948, pp. 170-171) pointed out, "Unfortunately, there seems to be no possible profit motive in being an educational innovator." The primary motive for more innovative schools must come through the school staff's or the community's desire for more effective learning by their children. However, the amount that learning increases as a result of adopting educational innovations is often difficult to measure. So the adoption motives for farmers and educators are different.

2. Another distinction is that there is no corps of change agents in education at all comparable to extension agents, farm dealers, and others in agriculture.

3. Likewise, educational innovations are less clear-cut in their advantage over the existing ideas they replace than in agriculture. Undoubtedly one reason for the relative slowness of educational adoption when compared with agriculture, medicine, or industry is the absence of adequate scientific sources of innovation in education. Chemical companies and the network of agricultural experiment stations provide accurate measurement under controlled conditions for a new idea. Farmers, as a result, have developed credibility for agricultural research as a source of innovations. Education, on the other hand, has only campus or university schools, and those classes in the nation's schools willing to cooperate in experimentation. Here, first responsibility is to the student, not to research. And the results of educational research are often ambiguous, incomplete, and confusing.

4. Innovation decisions in education may not be an individual matter. The unit of adoption is often a school system, rather than individual teachers. For example, many school systems establish innovation deadlines for adoption by all their teachers, as is fairly common today in the case of modern math. Innovations adopted by social systems rather than by individuals are likely to have a slower rate of adoption.

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[5] Pelley, J. H., Invention in Education, D. Ed. Thesis, New York: Teachers College, Columbia University, 1948, pp. 170-171.

In any event, educational diffusion occurs within a school system, as well as between schools. And in the case of innovation diffusion within a social structure, the norms, statuses, and formal structure of the system affect the process of diffusion.

A SUMMARY OF FINDINGS FROM DIFFUSION RESEARCH

1. The Innovation Process

An innovation is defined as an idea perceived as new by the individual (Rogers,[6] 1962, p. 13). Individuals go through a mental process of learning about a new idea, becoming favorable or unfavorable toward the innovation, and either adopting or rejecting it. The innovation process is individual; the diffusion process occurs for a social system. No matter what the change, someone in the school district proceeds through the innovation process If the change is one involving a single teacher using a different method, he will negotiate each of the steps. However, if the school district makes an administrative decision to try an idea, each individual teacher may not go through all the steps of the process. In this situation the decision-maker, for example, department head, curriculum supervisor or administrator, goes through the innovation process, while the teacher using the adopted innovation may jump directly from awareness to adoption.

Five steps have been postulated in the innovation process:

1. Awareness - The individual begins to hear of the new idea but he lacks information about it.
2. Interest - The individual becomes interested in the new idea and looks for more information about it.
3. Evaluation - The individual begins to try the new idea in his imagination. He tries to determine how it fits into his situation and how he could use it.
4. Trial - The individual tries the innovation in a small experiment to test its effectiveness.
5. Adoption - The individual, after having tried the new idea, puts it into standing operational procedure.

Currently, I prefer to conceptualize the innovation process in three fundamental functions, which are closely synonymous to stages in a process, except that they do not always occur in chronological order.

1. Knowledge (which includes the activity at the awareness and interest stages in the "adoption" process).
2. Attitude Change (The individual probably starts with neither favorable nor unfavorable attitudes toward the new idea, at least until after he first learns about it).

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[6] Rogers, Everett M., Diffusion of Innovations, New York: Free Press of Glencoe, 1962, p. 13.

3. Behavioral Change (either adoption or rejection). I prefer "innovation process" to "adoption process," because the former implies to me that all decisions must not necessarily end in adoption, but could also terminate in rejection.

Useful generalizations have emerged from past research on the innovation process, for example, that mass media communication channels are most important in creating knowledge about an innovation, but that personal communication channels change attitudes.

The three functions in the innovation process need not occur in any chronological order, other than that knowledge must occur first. Sometimes, individuals are forced to adopt or reject in spite of contrary attitudes. The compliance type of decision may occur often in schools and in other situations where the social structure exerts great influence on adoption or rejection. Also, further information-seeking may occur after the behavioral change stage, so as to reinforce already-made decisions.

2. Properties of the Innovation and Rate of Adoption

The rate of adoption over time varies considerably from one idea to another, as pointed out previously. The properties of an innovation, as perceived by adopters, affect its rate of adoption. Generally, more rapid rates of adoption are characteristic of innovations that:

1. Have more relative advantage over the existing ideas being replaced. Innovations like hybrid corn which increased yields about 20 percent are adopted more quickly than new ideas which have less relative advantage.
2. Are less complex; new ideas that are simpler to understand are adopted more quickly than ideas difficult to grasp. In education the adoption of a team teaching approach constitutes a more involved innovation than one of choosing a new text.
3. Are more visible; new ideas whose use and results are more plainly seen are more quickly adopted than those with results are difficult to perceive. An example is the increased use of the overhead projector. Teachers can readily observe the implications of this tool for improving instruction through a simple demonstration.
4. Are more divisible for trial; new ideas which allow small scale sample experiments are more readily acceptable than ideas which require a massive shift of effort at once and allow less possibility of trial. The decision to teach PSSC provides an example. An innovator cannot teach one day by the new method and one day by the old method so as to obtain a measure of difference.

5. Are more compatible; new ideas that fit with values and attitudes presently held more easily gain approval than those opposite to presently accepted practice. Modern math and PSSC fit current U. S. emphasis upon science; this compatibility with social values undoubtedly speeds their rate of innovation.

3. Adopter Categories

Innovativeness is the degree to which an individual is relatively earlier than his peers in a social system in adopting new ideas. Innovativeness appears to be a generally consistent type of behavior; individuals who are innovative for one idea tend to be similarly innovative for other new ideas.

As was indicated in Figure 1, most adopter distributions approach an S-shaped ogive over time. This S curve occurs because in the early years of adoption of an innovation, only a few individuals adopt. Later, the rate of adoption increases sharply as a large number of individuals adopt the new idea in each time period. At this point, the innovation becomes part of the lifestream of the social system. In the last stages of diffusion fewer and fewer individuals adopt in each time period as only the last "hold-outs" remain to adopt. The composite result of this adoption behavior is an S-shaped adopter distribution.

For the sake of easier conceptualization and understanding, the continuum of innovativeness is often arbitrarily divided into five adopter categories: innovators, the first 2.5 percent of adopt; early adopters, the next 13.5 percent; early majority, the next 34 percent; late majority, the next 34 percent; and laggards, the last 16 percent to adopt.

Innovators are venturesome individuals; they desire the hazardous, the rash, the avant-garde, and the risky. Since no other model of the innovation exists in the social system, (at the time they adopt), they must also have the ability to understand and use complex technical information. An occasional debacle when one of the new ideas adopted proves to be unsuccessful does not disquiet innovators. However, in order to absorb the loss of an unprofitable innovation, they must generally have control over substantial financial resources.

Their propensity to venturesomeness brings them out of their local circle of peers and into more cosmopolite social relationships. Even when the geographical distance between innovators may be considerable, they often have been found to form cliques. They are thus like long distance circuit riders who spread new ideas as their gospel.

The description of innovators is sharpened by contrast to that of laggards, who are the last to adopt an innovation. Laggards are localistic; many are near-isolates. Their point of reference is the past, and they interact primarily with those peers who have traditional values like theirs. Laggards tend to be suspicious of innovations, innovators, and change agents. When laggards finally adopt an innovation, it may already be superceded by another more recent idea which the innovators are using. While innovators look to the road of change ahead, the laggard has his attention fixed on the rear-view mirror.

A summary of characteristics and communications behavior of individuals in different adopter categories is found in Table I on Page 95.

TABLE I

SUMMARY OF CHARACTERISTICS AND COMMUNICATION BEHAVIOR OF ADOPTER CATEGORIES[7]

Characteristic or Behavior	Innovators	Early Adopters	Majority		Laggards or Late Adopters
			Early	Late	
1. Time of adoption	First 2.5% to adopt new ideas	Next 13.5% to adopt	Next 34% to adopt	Next 34% to adopt	Last 16% to adopt
2. Attitudes and values	Scientific and venturesome	Progressive	More conservative and traditional	Skeptical of new ideas	Agricultural magic and folk beliefs; fear of debt
3. Abilities	High level of education; ability to deal with abstractions	Above average education	Slightly above average education	Slightly below average education	Low level of education; have difficulty dealing with abstractions and relationships
4. Group memberships	Leaders in county-wide or state organizations; travel widely	Leaders in organizations within the community	Many informal contacts within the community	Little travel out of community; little activity in formal organizations	Few memberships in formal organizations other than church; semi-isolates
5. Social status	Highest social status, but their farming practices may not be accepted	High social status; looked to by neighbors as "good farmer"	About average social status	About average social status	Lowest social status
6. Farm businesses	Largest, most specialized, and most efficient	Large farms; slightly less specialized and efficient	Slightly larger than average sized farms	Slightly smaller than average sized farms	Small farms; low incomes; seldom farm owners
7. Sources of information	Scientists; other innovators; research bulletins	Highest contact local change agents; farm magazines; extension bulletins	Farm magazines; friends and neighbors	Friends and neighbors	Mainly friends and neighbors; radio farm shows

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[7] North Central Rural Sociology Subcommittee for Diffusion of Farm Practices, Adopters of New Farm Ideas: Characteristics and Communication Behavior, East Lansing: Michigan Extension Service, 1960.

How do schools like Newton, Winnetka, Shaker Heights, and Cape Kennedy differ from their more laggardly sister schools? In short, innovators . . .

1. Are relatively higher in social status.

2. Tend to use mass media rather than personal communication channels.

3. Are more cosmopolite; they travel over a wide area and have social relationships outside of their social system.

4. Exert opinion leadership. Because of their prior experience with the new idea, innovators obviously are in a position to influence the adoption decisions of their peers. Several studies have shown, however, that the norms of the social system may act as an intervening variable between innovativeness and opinion leadership. For example, in communities where the norms are traditional, innovators are not looked to by their peers as sources of advice.

5. Are viewed as deviants by their peers.

6. Are wealthier; the Mort studies (Ross,[8] 1949) found a consistently high relationship between the financial resources of a school system and its innovativeness, although Carlson (1962, p. 340) reported no such relationship in the case of modern math.

4. Opinion Leadership

In every social system there are certain individuals who have a relatively disproportionate share of influence over their peers' decisions. Opinion Leadership is the degree to which individuals are sought for information and advice. Opinion leaders, when compared to followers, seem to conform more closely to the norms of the social system. They serve as role-models for others in the system. Individuals tend to interact most with others who have similar characteristics, values, etc. Thus, we find that the innovator is often too far ahead of the rest of his social system to offer a good model; opinion leaders are more often early adopters.

Some of these patterns of influence and opinion leadership can be observed in Figure 3, which deals with the spread of 2,4-D weed spray in one Midwestern Rural Neighborhood. Undoubtedly, somewhat similar patterns of influence about an innovation occur among teachers in a school.

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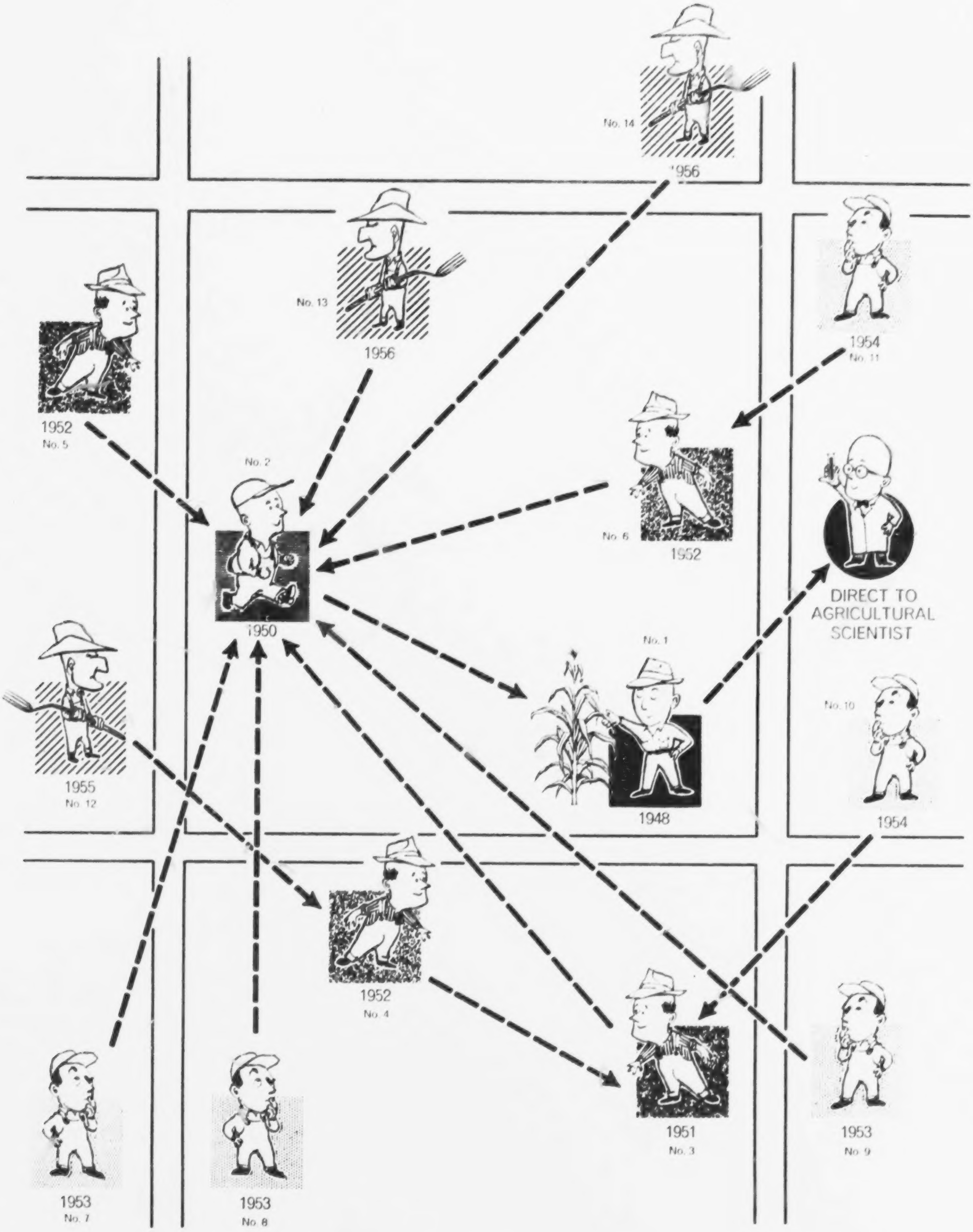
[8] Ross, Donald H., Administration for Adoptability, New York: Metropolitan School Study Council, 1949.


No. 14
1956
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SCIENTIST
No. 1
1948
No. 10
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No. 12
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No. 4
1951
No. 3
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No. 9
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No. 7
1953
No. 8

Figure 3. Patterns of Influence in the Diffusion and Adoption of 2,4-D Weed Spray Among Fourteen Farmers in One Midwestern Neighborhood.[9]

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[9] North Central Rural Sociology Subcommittee for Diffusion of Farm Practices, Adopters of New Farm Ideas: Characteristics and Communication Behavior, East Lansing: Michigan Extension Service, 1960.

IMPLICATIONS FOR CHANGE AGENTS

Certain implications may be drawn from past diffusion research that may be useful to administrations of educational organizations.

1. Selection of "Good" Innovations

One important role of the educational change agent is to select good innovations, and discard those innovations which will be inappropriate for his clients to adopt. In this role, the change agent plays the task of "gatekeeper," which he should be qualified to do on the basis of his superior training, expertize, wide communication contacts, and access to other experts.

2. Developing Ability of Clients to Evaluate Innovations

Too often, change agents simply seek to promote widespread adoption of innovations, rather than to try to increase the ability of the members of the client system to evaluate innovations. This tactic may mean that change agents would not use "innovation bribes" to influence schools to adopt language labs and other experimental projects. Rather, these change agents would seek to provide their clients with basic understandings underlying the nature of the innovations they are promoting.

3. "Packaging" Innovations

Change agents can often achieve a more rapid rate of adoption for a given, "good" innovation by packaging it in certain ways rather than others. In essense, this approach seeks to use the characteristics of innovation (for example, relative advantage, compatability, etc.) to achieve a more rapid rate of adoption. An example, perhaps, might be found in the case of modern math. By labeling this idea as "modern," its sponsors undoubtedly newness. One might wonder, how "modern" will our modern math be 25 years from now?

Another example of packaging is the change agent who "ties in" an innovation with a bundle of related practices. Perhaps one of the best examples is the India "package programme," in which farmers are urged by change agents to adopt a complete package of farm innovations, including fertilizers, improved seeds, irrigation, etc.

4. Working Through Opinion Leaders

Figure 3 illustrated the importance of working through opinion leaders. One can imagine the greater effectiveness of a change agent who concentrates his attention upon farmer number "2" in Figure 3..

To some extent we could use demonstration schools as opinion leaders in education. Demonstration schools will be effective in diffusing educational innovations to the extent that these demonstrators are similar to the schools we are seeking to influence. This is one reason why university schools and lab schools are largely ineffective as demonstrations, and are often being discontinued in the U. S. They had largely become elite schools for the education of intellectually-talented faculty children. This eliteness destroyed their credibility as demonstrators.

I would suggest that we seldom use demonstration schools wisely to disseminate new ideas. How do we determine who visits the demonstration school? What follow-up do we make with these visitors after they return to their home schools? Could the same function of demonstration be fulfilled by an effective film showing the same innovation in practical school use?

5. Basing Programs on Needs

Earlier in the present paper, I discussed the compliance adoption decision in which the individual is forced to adopt by the system. In other words, the individual felt no need for the innovation. One would suspect that once the structural influence were removed, the individual would reject the innovation.

Generally, innovations will be adopted more readily and permanently if they answer needs perceived by members of the client system. This implies that the change agent should select innovations which promise to fulfill his clients' needs. Also, he should devote part of his efforts to developing these needs on the part of his clients.

6. Anticipating the Consequences of Innovations

A change agent should anticipate the consequences of an innovation in his social system; and if these effects are undesirable, they should be avoided. The literature of anthropology is replete with cases of primitive societies which disintegrated after well-meaning change agents introduced new ideas, which turned out to have undesirable as well as desirable effects.

Is about the same occurrence not involved in the case of certain educational innovations which are only fads or fashions?

One means to anticipate the undesirable consequences of innovations is to try them out in pilot schools on a field trial basis.

Conclusion

In this paper I have sought to trace some of the main findings from diffusion research and to apply these to education. The real value of this exercise will be evident when we have numerous, careful studies of the diffusion of educational innovations. I urge you to devote some of your plentiful research resources to this priority topic.

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APPLYING THE PRINCIPLES OF DIFFUSION TO UTILIZATION OF RESEARCH

by

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The Ohio State University

I feel very fortunate to have had the opportunity to take part in the Research Seminar for the past four days. As a former school administrator and a trainer of public school administrators, I feel that you have treated us kindly. It has, indeed, been a learning experience for me, too.

When Bob Taylor, Jim Christiansen, and I talked some months ago about my possible participation in this conference, they asked that I focus primarily on two specific areas. First of all, they requested me to examine Dr. Rogers' analysis of diffusion research;and secondly, they asked that I focus on some very practical problems involved in the diffusion of research. To quote directly from those conversations, "What are the nuts and bolts issues involved in the diffusion of research?" This I am happy to attempt, for as we examine past innovation efforts, we often find that this is the area where we have been least successful--the area where we have done so very little to exchange traditional methods for creative new approaches to the problem.

Even the most cursory examination of recent legislation which provides for the funding of new research efforts reveals evidence of conscious concern for the diffusion of research on the part of framers of this legislation. It is also interesting to note that this concern for diffusion is not restricted to any one field or subject-matter area. In this sense, these new efforts represent a commendable departure from the traditional. Clearly, the challenge has been presented and funds in amounts not formerly available in education are potentially at the disposal of those who are interested in initiating planned change in education.

While I have been asked to focus on a specific area in the conference, I would like to take the liberty to draw upon a number of the presentations which have been made this week in addition to the pointed references in the presentation made by Dr. Rogers this morning. I have also been requested to allow you a very ample period for questions. Initially, I would like to draw heavily on the Lee, Brickell, and finally the Rogers presentations.

Dr. Rogers has pointed to the fact that we have spent tremendous resources in education in developing educational innovations and additional thousands of dollars in inducing local schools to adopt them, yet as a serious student of the field he is able to identify only one United States educational researcher who has devoted all of his time to the scientific study of how these new educational ideas diffuse. I believe that we do have some modern examples of successful rapid diffusion of educational innovation, but I would have to agree that systematic scientific study of even these dramatic innovations is not available to the student of change. As one illustration, I would like to make some reference to some programs that have been widely adopted in the United States in a relatively short time. I refer specifically to the Course Content Improvement Programs of the National Science Foundation. These include such programs as the Physical Science Study Committee's secondary school physics program, the School Mathematics Study Group's program in elementary and secondary mathematics,and the Biological Sciences Curriculum Study Program in high school biology. These are recent programs, introduced during the past seven years, and their adoptions by school systems have been at a rate which surpassed the introduction of any past innovations in American education. In the case of P.S.S.C. for example, we find that in a period of five years, this program has moved from introduction in seven schools to an estimated use by 40 per cent of all students electing high school physics. In its second experimental year, with materials clearly labeled as"experimental," over 500 teachers and 50,000 students used the B.S.C.S. biology materials in 35 states--indeed a test group of major significance.

Dr. Rogers has given you some figures on rate of adoption of new programs which he has labeled "modern mathematics." In one of these programs, Dr. E. G. Begle, Director of the School Mathematics Study Group,stated that in a two-year period over six hundred thousand S.M.S.G. textbooks were purchased for use in grades 7 through 12, within five years after the initial introduction of the materials. Certainly we have in these and other similar programs ample evidence of a new adoption rate in American education. If we examine the literature relative to evidence of diffusion research related to these programs, we find little in the way of careful analysis. If, on the other hand, we examine the programs themselves, their planning and development procedures, their provision of resources for testing, revising and dissemination, we can observe concrete evidence of new approaches which they have utilized. Here we find ample recognition of the fact that planning stages require many diverse talents, provision for long-term coordination, stimulation and appraisal activities and lastly the allocation of resources commensurate with the task undertaken. Much remains to be done in terms of diffusion research on these new National Science Foundation programs and on others that have been undertaken since these initial efforts were pioneered by scientists and mathematicians.

Dr. Rogers' research reported to you this morning has supported the fact that recent innovations have enjoyed an increasingly rapid rate of change. He suggests that this increase in adoption rate may be due to "the ethos of the past sputnik era," improved travel, mass communication, more professional staff and differences in the innovations themselves. In his review of 732 innovations, he has pointed to the "amazing similarity of findings of each of six major research traditions" as they pertain to the diffusion of innovations.

As I reflect on the excellent presentations which have been made during these past four days, it would appear that we have some implied areas of agreement which are worth noting at this point.

1. In a number of ways we have clearly implied and agreed that research and development is not the exclusive domain of any one agency, group, or institution.

We have alluded to the roles of the state departments of education, the colleges and universities, the United States Office of Education, as well as local school systems. We have identified the necessity for involvement of these groups, and we have also pointed to the need for imaginative new plans to provide for the coordination of the efforts of these agencies. Making resources and personnel available in adequate amounts and at the desired times in order to move from the initial research effort to the successful diffusion and adoption of appropriate findings of this research has been given attention by a number of the seminar speakers.

2. There is no single best way to carry through the research, development, field testing and dissemination activities involved in innovation.

One of our problems is to make certain that we examine all of the possible alternatives and choose the one most appropriate to the task we have outlined for ourselves. One of the problems in making a choice from among a number of alternatives is that of assessing the forces with which we must ultimately deal if the innovation is to become widely adopted. One agency which we haven't mentioned very often during this conference is the professional organization. In most cases, it is not a single professional organization,for if we consider all phases of research and development, we find a number of identifiable professions present at various points in the research and development process. Let's take one example here--P.S.S.C.

At the initiation of this project the P.S.S.C. group worked closely with the American Institute of Physics, the American Association of Physics Teachers, and the National Science Teachers Association. While I do not have time here to describe the specific types of involvement in each case, I would like to make three points.

a. These professional groups were involved very early in the formative stages of the project.

b. A sincere effort was made to include their concerns in any proposed new program.

c. They continued to be active as the program developed.

Another evidence of a new type of activity on the part of a professional education group can be observed in the activities of the American Association of School Administrators over the past ten years--activities which have significant implications for the adoption of innovation at the local school level. This is indeed a factor to be considered if we concur with Dr. Brickell in the importance of the administrator as an inhibitor or facilitator of innovation. The A.A.S.A. has initiated a program which is designed to give the practicing administrator some voice in the selection of persons to be trained as school administrators,and this professional organization has also developed an accreditation plan which results in the profession's having some voice in the content of the program designed for training educational administrators.

Another professional activity which has only begun to be a factor which must be considered in the research and development process is the relationship of teachers, school board members, professional organizations, and state legislatures in this expanding new area of professional negotiation and collective bargaining. New and strikingly more comprehensive contracts are being written in this area and professional organizations are taking strong stands as is evident in New York, Utah, and Oklahoma. One of the most crucial questions and one which concerns the topic of our seminar is--What areas are appropriate for negotiation? Even the most cautious observer would have to admit that the scope of negotiable items is being broadened. In one major agreement for example, in addition to the traditional areas of salary, welfare and working conditions, the following topics have also been agreed upon as negotiable items by the parties to the contract:

a. General objectives and long-term educational goals.

b. Recruitment of qualified teachers.

c. The improvement of difficult schools.

d. The reduction of class size.

e. The development of a more effective curriculum.

The extent to which the last area is implemented could have serious implications for the diffusion process.

Still other references supporting the profession as a force to be utilized in the area of diffusion could be identified but time does not permit.

3. Another area of concern during the past four days of our seminar could probably be summarized by stating that conditions affecting research, development and dissemination vary from state to state, but in each case there are conditions which impinge on the program,and these conditions or forces must be dealt with in some way if innovation is to be successful.

If I may, I would like to make two observations relative to this point.

a. The types of conditions which face the innovator will vary not only from geographical area to area but also variations will occur as we move from one content area to the other.

b. While these conditions will not, in some cases, impinge on the innovation until it reaches the dissemination stage, they need to be planned for in the earlier stages of research and development.

Let me use P.S.S.C. as an example. One of the conditions which P.S.S.C. had to deal with early in the planning stages of its program was the relationship of the College Entrance Examination Board's achievement test in the area of physics. This examination has assumed an ever increasing importance in the area of college admission. The designers of the P.S.S.C. program took the position that a new selection of content for a program in high school physics would necessitate some revision in the examination designed to measure achievement in the program. In its initial year the P.S.S.C. and the College Entrance Examination Board issued a joint written statement on the interpretation of C.E.E.B. physics test scores for those students enrolled in the P.S.S.C. program. A copy of this letter was sent to all colleges and universities to which P.S.S.C. students applied for admission. Later an alternate C.E.E.B. physics examination was developed for P.S.S.C. students and finally the C.E.E.B. examination was modified to include appropriate P.S.S.C. materials.

Moving to the "nuts and bolts" phase of dissemination we can also note some other provisions in this program which helped to speed dissemination of the innovation.

a. Initially, free textbooks were furnished to the early schools which participated. This had implications when we consider adoption plans, book rental programs, and other textbooks arrangements prevalent in schools across the country.

b. Free newly designed achievement tests were also furnished.

c. In some cases new laboratory materials were made available to schools without cost--this might be a factor in a school system which has just built and equipped a new school, but would like to participate in the new program.

Even a hasty examination of factors such as those mentioned above will illustrate the fact that these conditions will vary as we move from geographical area to area and as we move from one content area to another.

I don't think that we have mentioned any subject more frequently during this seminar than we have the need for adequate and diversified staff as we consider the research and development process.

4. We seem to agree that in the research and development effort there is a need for an adequate staff with many different competencies, drawn from diverse societal agencies and that these diverse resources need to be placed in new and unique relationships.

Personally, I believe that this is our most serious problem as we contemplate mounting significant research and development efforts. Many argue that if we were to carefully assess the talent available and the challenge being presented in terms of support which is now visible, we need not only to develop imaginative plans for utilizing resources presently available in all disciplines, but we also must face the task of training new people; and we must, in the planning, phases of our programs, provide resources commensurate with the task.

We can note some new innovations here if we again examine some of the new programs mentioned above. These programs have not depended upon the traditional methods for diffusing innovation. Rogers makes the point earlier that "innovations adopted by social systems rather than by individuals are likely to have a slower rate of adoption." Traditionally innovation has been carried out in isolated areas. Innovations have been designed, tested, demonstrated, and then recorded in professional journals. The innovation sites are subsequently visited and sometimes the program or portions of the program have been adopted by the visitors. Publishers and developers of material recognize the innovation and it may then be included for wider distribution.

It is interesting to note the departure from this procedure which was followed by the developers of the Course Content Improvement Programs of The National Science Foundation. In the initial stages experimenters (teachers) were very carefully selected. No one was allowed to use these materials without careful screening and then a significant training program was developed for every participant. In the ensuing phases, these initial innovators were further screened and those who survived this screen were utilized to train an ever expanding group of participants. Gradually, the new materials were also included in pre-service training programs for new teachers. When we assess the total cost of these programs, we note that a considerable allocation of resources utilized by these programs were used for training purposes. These groups utilized all available talent but committed themselves to training additional staff to insure a fair trial of the new materials by persons competent to use these new programs. This would appear to be a significant departure when we consider the implications for the future of carefully developed innovations if they are introduced by persons not properly trained to utilize them. We must then allocate resources appropriate to the task. If a six-week institute is necessary for training purposes, let's not try and do the job with a drive-in conference or a two- or three-day workshop. It is also important to point out here that our training responsibilities are not related exclusively to the dissemination stages. Our needs at the research and development stage are also significant and the supply is short.

5. While the types of talent needed vary greatly in the various stages of research and development, there is a need to include representatives from all of the various talents in the early stages of planning.

In recent innovations, a recognition of this principle is often visible in the composition of the initial steering or planning committee. While each individual stage will require a predominance of one type of skill or talent, consideration must also be given at each of these points to phases which will follow. Some recognition of this principle is evident if we examine the composition of the steering or planning committees used by the N.S.F. Course Content programs which have spread so rapidly. Representatives from professional organizations, publishing houses, communications media, testing agencies, and business and industry are new additions to planning units in education. Implications for the total planning task in terms of conditions and forces pertinent to the research and development phases of innovation appear to have been included at the very outset in these new programs.

In this connection, it was also encouraging to note some comments made by Dr. Guba earlier in this seminar. A first-rate researcher in his own right, he recommended the utilization of public school personnel at the problem definition and research levels. He pointed to a great untapped resource here. In addition to the research competencies which can be found in some public school personnel, their inclusion in the early phases of the research and development process enable them to provide double service as their contributions to dissemination activities are equally important. Many of the problem areas appropriate for research and development efforts are often visible to school personnel long before they become apparent to the agencies traditionally concerned with research and development activities. A dramatic case in point is the recent attention given to the need for new programs for the culturally deprived. Public schools were dealing with problems associated with cultural deprivation long before colleges and universities recognized the need for developing new programs and altering their teacher training experiences.

If we are willing to concede the need for a great variety of talent in the initial planning stages and in the phases which follow, we need also to consider potential impact of these staffing implications on the agencies which furnish the personnel. Again problems vary a great deal as we examine the different agencies which might contribute personnel. First of all, when we select personnel and make assignments, we must make certain that the assignment is a reasonable and a realistic one. In so many cases, responsibilities are added to persons who already have a full load without removing any of these responsibilities. In other cases, we have not maximized the contribution which the project can make to the agency from which the person has been drawn. In other cases we innocently create problems for the institution. From the university point of view, I can point to a number of problems created by full-time involvement in a project. In some cases when we remove an outstanding person from his area in a university staff, we temporarily at least remove one of the university's most valuable resources. Students who have been attracted to the university to study with this person find that he is no longer available to them. The removal of a person for a two- or three-year period thus makes a major impact on the program. In other cases, full-time involvement of project staff can have undesirable effects which tend to isolate the project and thus reduce the potential impact of the project as it relates to the on-going program of the institution. Carl Schaefer offered one possibility here by suggesting the appointment of two persons each on a half-time basis to the project and the replacement of these two half-time positions through the appointment of an additional person on a full-time basis. In this way, maximum stimulation can be provided for both the project and the on-going program of the university or other cooperating agency. In the field of public schools we have only scratched the surface in terms of the possibilities available in extended summer contracts for personnel and released time arrangements.

In the comments outlined above, I have tried to react to the five steps in the innovation process postulated by Dr. Rogers. I have tried to examine the environmental or field of forces within which both the social system and the individual relate to the innovation process from awareness to adoption. I would tend to agree that the rate of adoption varies considerably from one idea to another. The properties of an innovation may affect its rate of adoption, but I am not certain whether this variation in adoption rate is due to its perceived complexity as viewed by the potential adopter or the use of common dissemination techniques regardless of the complexity of the innovation. We may not have had the resources available commensurate with the tasks we have undertaken. We may also not have been able to think "big enough" because of prior conditioning. For example, how many of us would have conceived a new high school physics program that would require $7,000,000 to develop and disseminate--back in 1956.

As I attempted to review and react to Dr. Rogers' six implications for change agents, I found myself in general agreement but somewhat concerned that all implications might not be clear to the casual reader. So much is included in each of these statements. In the materials presented above, an attempt has been made to both react to and amplify these implications.

In selecting "good" innovations for example, what criteria does the "gatekeeper" use? Which ones is he free to use? Which ones are imposed upon him by the social system of which he is a part? Some are local, some are regional, some are national. What kinds of resources do we need to develop and disseminate the innovation? When we speak of developing the ability of clients to evaluate innovations, we are outlining a tremendous task. It may have to be done once by one group at the national level for example and then again at the local level. Dr. Rogers pointed to the necessity for basing programs on needs as we identify the varying needs of local public school systems in terms of purposes and goals of these institutions we immediately build in requirements which must be recognized and planned for.

The definition of the innovation package or the packaging of innovations may be restricted to the typical marketing definition of that term,as we may choose to include in the "package" much of the planning research, development and dissemination activity as our definition of the total "package." The "package" is very different as we move from one definition to the other.

I have tried to expand a bit on Dr. Rogers' opinion leader categories to include agencies which perform an important role in developing educational opinion groups such as colleges and universities, testing agencies, publishers, professional organizations, state departments, and accrediting agencies. Again let me underscore how much these influences of opinion vary as we move from area to area.

In anticipating the consequences of innovation, we have pointed to the need for careful appraisal and also for the inclusion of persons capable of assessing the consequences of innovation at the conceptual, design and planning stages of the innovation.

I found Dr. Rogers' paper most helpful in providing a framework on which to hang some of my concerns and observations relative to the change process and more specifically the diffusion process. It has been a most stimulating experience for me to take part in your seminar, and I would like to again thank those who made it possible.